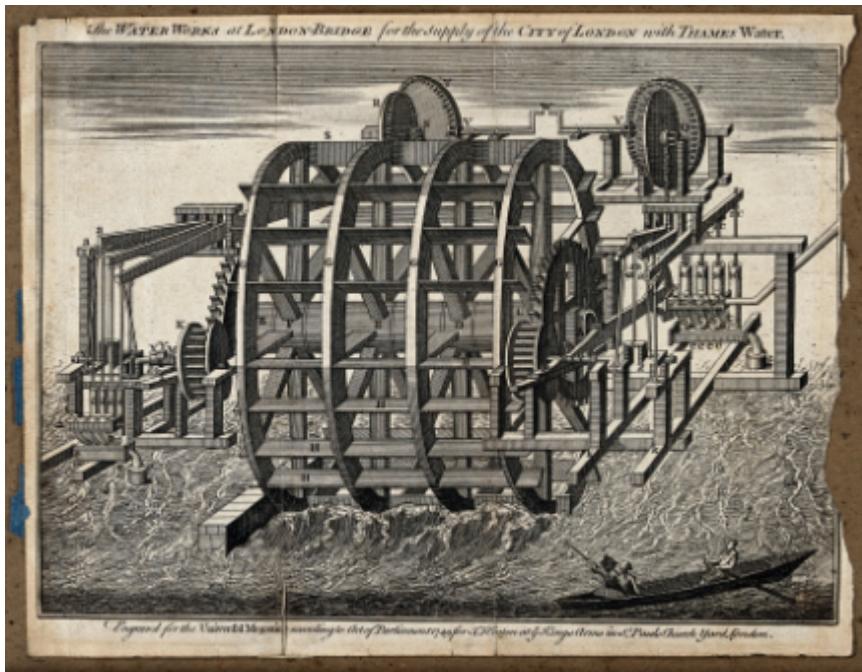


# Keeping the Sweet Thames Sweet

The Victorian Drainage Dilemma



Ray Elmitt



*This water-wheel, installed in one of the arches of London Bridge, was used to supply water to the City of London from 1700 - 1825.*

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## Preface



FATHER THAMES INTRODUCING HIS OFFSPRING TO THE FAIR CITY OF LONDON.  
*(A Design for a Fresco in the New Houses of Parliament.)*

Arguably the most down-to-earth yet intractable problem facing communities and their local government institutions in the second half of the nineteenth century was simply this:

*how to deal with the human waste generated by an ever-growing population?*

It was a topic that occupied huge numbers of column inches in newspapers and fuelled lively and sometimes bitter debate.

How did such an unprepossessing issue come to force itself centre-stage on the attention of so many worthy and capable politicians - from both central and local government?

Why did it leave them struggling to find solutions for so long?

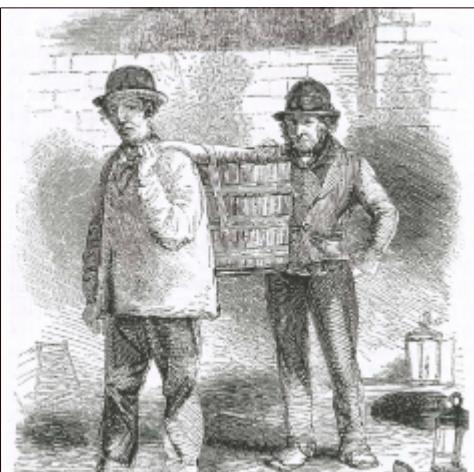
How was it eventually resolved?

This account seeks to answer these three questions both for Central London with its Metropolitan Board of Works and for the 27 communities in the lower reaches of the Thames from West Molesey to Mortlake and the 12 local government bodies that served them.

# Prologue

## Traditional Sanitary Practices

For generations, people had availed themselves of two basic sanitary provisions: the well for their water and the cesspool (or privy) for their relief. It was accepted that the two facilities should be kept separate although the scientific imperative behind this was slow to emerge. Cesspools (and their smaller cousin, the privy) held back the solid element of human waste whilst allowing liquid to percolate into the ground or be carried off by local streams. The cesspools were emptied by night soil men (left) and the contents sold to local farmers as manure for their crops. Thus a seemingly virtuous and self-sustaining cycle existed.



Two factors upset the equilibrium of this long-serving approach. Firstly, huge population growth (central London grew three-fold between 1801 and 1861) generated more waste whilst the outward spread of towns meant the primary consumers of this waste (i.e. farmers) were now located further away. The night soil men, having further to travel, put up their prices just at a time when - starting in the 1840s - Britain began importing cheaper guano fertiliser from Peru in significant quantities. Unable to get their existing cesspools emptied, householders had new ones dug until some gardens were honey-combed with these "receptacles of filth". The second factor that brought about a change in sanitary approach was the increasing availability and use of piped water supplies, often leading to the installation of water closets and creating water-born sewage systems. The resulting larger volume of liquid waste frequently overwhelmed the existing infrastructure and often ended up entering the local aquifers and contaminating well water.

## The need for change

A new approach to sanitation was needed, designed to run at a community level rather than on an individual property basis. There were clear advantages in having an integrated system of sewers capable of carrying off the waste of a whole community to a plot of land where it could be treated collectively and disposed of by irrigation, filtration or precipitation. To implement such schemes, local authorities would need new powers sanctioning them to raise capital and to enforce adoption of their schemes. Parliament therefore passed a programme of enabling legislation in the mid-1800s to provide such powers locally, but its adoption was not compulsory. The traditional *laissez-faire* system of government in Victorian Britain typically left it to local communities to choose whether they wished to adopt the new powers offered or to remain with the existing less-powerful Vestry system of local administration. But attitudes and practices were changing, driven by pure economic considerations.

When Queen Victoria came to the throne, only half of London's infants lived to their fifth birthday. The economic impact of such attrition in the future workforce - and hence Britain's continuing ability to compete in world markets - became an increasing concern. The 1837 *Registration Act*, in establishing a national system for recording births marriages and deaths, also enabled mortality rates to be compared across the country. For the first time the links between poverty, ill-health and the cost of both of these to the local community became firmly established. Under the 1848 *Public Health Act*, the establishment of a Local Board of Health became mandatory for any community with a death rate above 23 per 1,000.

With a growing sanitary crisis looming, the government moved to shore up the existing infrastructures. In the 1847 *Towns Improvement Clauses Act* local authorities were given specific powers for their sewers

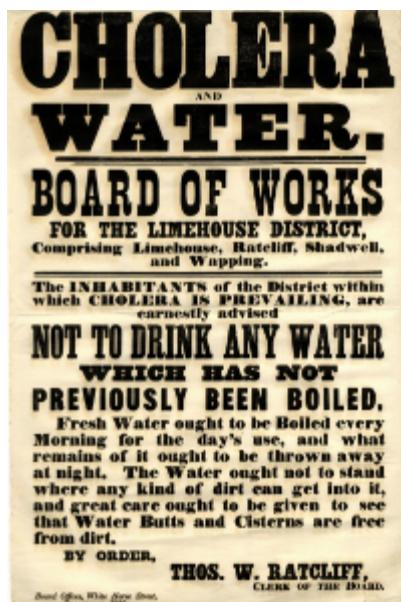
*to communicate with and empty themselves into the sea,  
or any public river.*

However, many local authorities were by now also openly sanctioning their populace to connect private cesspools directly to the local sewer system. The effect of the new legislation was therefore to legitimise the use of rivers to rid the community of its waste. This would soon come back to haunt the government. Meanwhile a different catalyst was bringing about a fundamental rethink of national sanitary strategy.

## Cholera

The first incidence of cholera in England had occurred in Sunderland in October 1831 when a ship carrying sailors who had the disease docked at the port. The disease made its way northwards into Scotland and southwards toward London. Before it had run its course the disease had claimed some 52,000 lives, including 6,500 in the metropolis. The symptoms were vomiting, diarrhoea and sweating. Death could - and usually did - occur within hours of the first symptoms showing. The cause of the disease was unknown and opinions were divided as to how it was transmitted: was it by touch (contagion) or by smell (miasma)?

Miasmatic thinking dominated official medical and government policy. As a result, and following a second cholera outbreak in 1848-9 which killed 14,137 in London, the sewer system in the metropolis was regularly flushed to get rid of the smell (and hence, it was thought, the risk of disease) from the houses and streets - but at the expense of hugely polluting the Thames itself. Yet because these measures were actually ineffective, cholera returned once again in 1853-4 with deaths in London totalling 10,738.



## The Great Stink

In June 1858, the combination of sewer flushing and a severe and prolonged heat wave provided "perfect storm" conditions that would directly and swiftly lead to a radical change in policy. The level of the Thames had dropped significantly leaving raw sewage deposited on the foreshore. For several days it lay there whilst temperatures in the shade averaged mid-30s °C - rising to 48 °C in the sun. The effect on the accumulated sewage was so noisome that the Press soon began calling the event "The Great Stink". The government attempted to carry on business as usual in its newly reopened Houses of Parliament by the river but the stench forced MPs to retreat from some of the committee rooms on the other side of the building. On 15 June 1858 Disraeli, the Chancellor of the Exchequer, responded to what he described as

*a Stygian pool, reeking with ineffable and intolerable horrors*

and tabled a bill (it passed in just 18 days) that would authorise the Metropolitan Board of Works (MBW) to borrow £3m (now £7.5bn) to fix the problem.

The MBW's Chief Engineer Joseph Bazalgette had by 1856 already completed plans for a combined system - capable of handling both sewage and rainwater - to serve the total area covered by the MBW (which went as far west as Hammersmith and Putney, north to Stamford Hill, east to Beckton and south to Crystal Palace). Bazalgette's plans were based on a hierarchy of small street sewers (existing and new) with a combined length totalling 13,000 miles. These would in turn feed into six new main intercepting sewers (three serving the area on each side of the river) built at different heights to match the contours of the surrounding areas. These



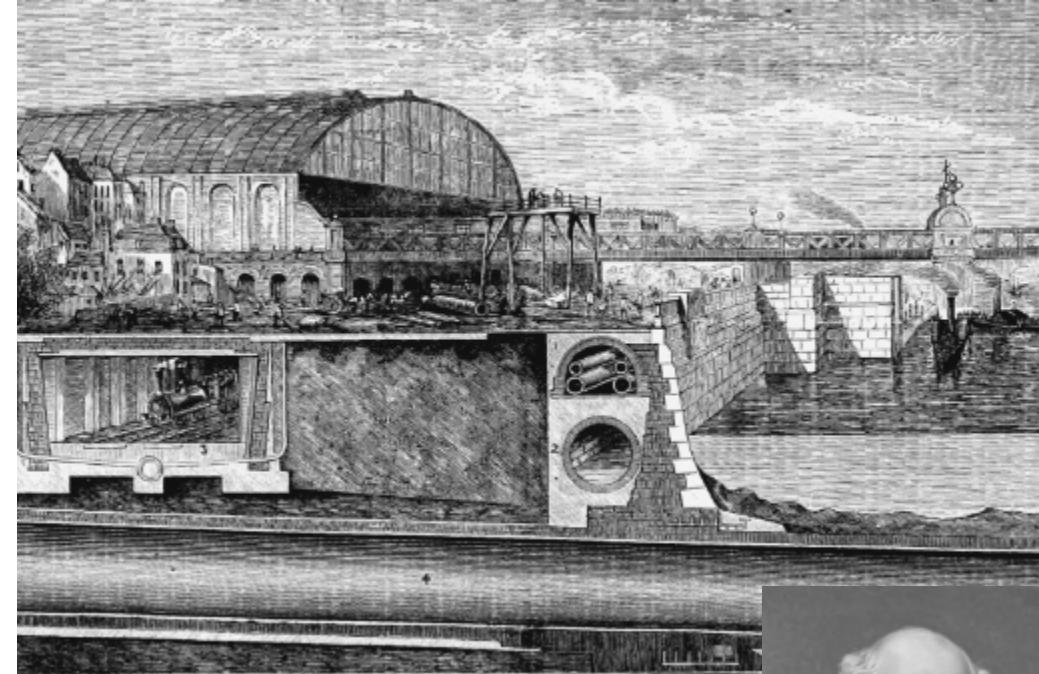
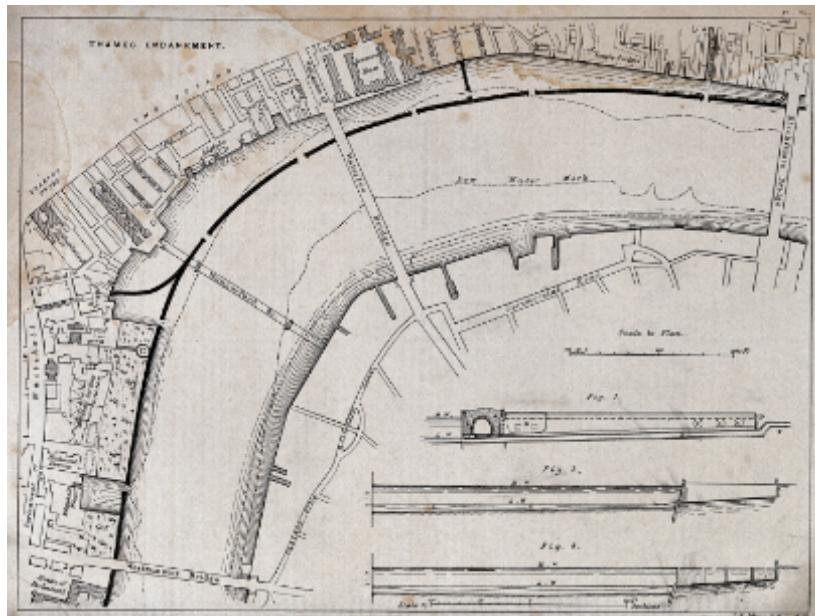
totalled 450 miles in length, with the lowest-level sewers being hidden within massive new embankments - Chelsea and Victoria on the north side, Albert on the south. (The works reclaimed over 52 acres of land from the Thames.) Finally, major pumping stations raised the flows from the intercepting sewers into a gravity-fed outfall sewer on each bank of the river to the final discharge points of the (untreated) sewage at Beckton in the north and Crossness on the south side, both sites being beyond the boundary of the metropolis as stipulated by Disraeli in his original bill.

Despite the vast scale of these works, the southern part of the system had already been completed by April 1865 and began operation. The northern drainage system followed in 1868.

In 1866 there had been a further cholera outbreak in London that claimed 5,596 lives, but it was confined to an area of the East End which was not yet connected to Bazalgette's system. It was the last outbreak of the disease in the capital. However since the link between cholera and sewage contamination in drinking water was not yet generally recognised, the eradication of the disease by the new system was more of a lucky bonus than an intended outcome.

*Below: Plan of the Thames Embankment*

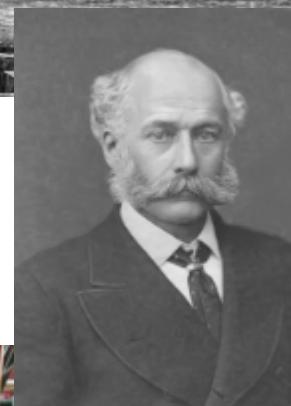
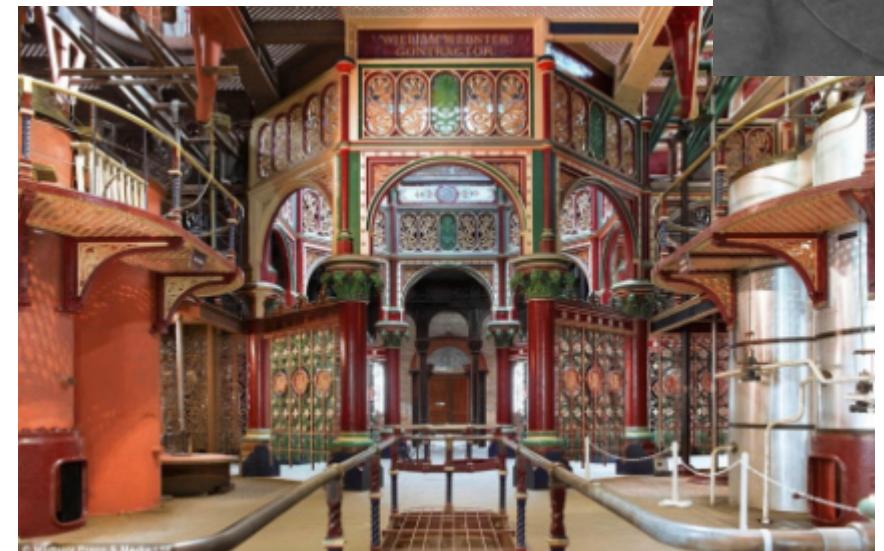
Courtesy of the Wellcome Foundation



*Above: Victoria Embankment under construction at Charing Cross station showing Hungerford Bridge and the tunnel for the District/Circle Lines.*

*Right: Sir Joseph Bazalgette*

*Below: Crossness Pumping Station*



## The Focus Moves Upstream

Having ensured that, in due course, central London would no longer be polluting its own stretch of river, it was inevitable that the government's attention would next turn to those communities upstream who continued to use the Thames to carry off their sewage outfalls. *The Thames Navigation Bill* of 1866 placed the whole of the river - from Cricklade to the sea - under the jurisdiction of the Thames Conservators. In a complete reversal of their 1848 legislation, the government decreed that

*no new flow of sewage into the river or its tributaries was allowed and existing sewage works were to be removed.*

Penalties of £100 per day could be levied although a period of grace was allowed for removal of existing connections.

This threat of draconian penalties focused the attention of the 10 riparian communities who had existing sewers connecting to the river (see table). Between March 1869 and August 1877 these authorities devised 11 different schemes to divert their sewage from the river and instead process it at a treatment works.

The scale of expenditure for such schemes was well beyond the scale of affordability for any of these authorities. The government therefore created the Local Government Board (LGB) which took over the public health, relief of the poor and local government responsibilities from the Home Secretary. The LGB was the body to whom local authorities could also apply for funding since they also administered the Public Works Loan Commissioners. On receipt of such an application, the LGB would appoint one of their Inspectors to visit the locality and conduct a Public Inquiry. This was usually in the office of the authority but for more controversial hearings larger premises would need to be found. The hearing would receive arguments from supporters and opponents of the proposed scheme, very often presented by QC's and other senior members of the legal profession. Many of the objectors would have no strict *locus standi* (i.e. legal right to have their objections heard) because they would not be directly affected by the scheme under discussion. Frequently however the LGB Inspector took a more

Community	Local Authority	Sewers?	Rural Sanitary Authority
Kingston upon Thames	Borough	Y	n/a
Surbiton	Improvement Commissioners	Y	
Richmond	Local Board	Y	
(Twickenham)		Y	
Ham		Y	
Teddington			
Hampton Wick		Y	
New Malden			
East Molesey			
Barnes		Y	
Kew	Richmond	Y	Kingston
Petersham			
North Sheen			
Mortlake		Y	
Petersham			
Hampton	Vestry		
Coombe			
Malden			
Tolworth			
Long Ditton			
Thames Ditton			
West Molesey			
Esher			
Hook			

*Communities covered by this book. All but Twickenham were erstwhile members of the Lower Thames Valley Main Sewerage Board.*

tolerant view of this distinction than the legal professionals present would have wished. Hearings could last for several days - or even weeks. At the end the Inspector would then go away and prepare his report to the LGB in which he would recommend approval or rejection of the application. The result would be announced several weeks - or even months - after the hearing. The Inquiry process was therefore lengthy and expensive with all the costs of the hearing ultimately being born by the rate-payers of the applicant local authority.

The first four schemes to be subject to an LGB Public Inquiry were submitted (two each) by Kingston Borough and Richmond Local Board. Each elicited fierce attack from opponents many of whom as usual were only remotely - if at all - affected by the proposals. Three schemes were rejected following the Inquiry while the fourth, although accepted, was subsequently abandoned over doubts over the viability of the proposed method of disposal. Overall the costs involved in the Inquiries along with the seemingly low chance of success was acting as a huge disincentive for authorities to carry out their duties under the 1867 *Thames Navigation Bill*.

In an attempt to resolve the *impasse*, Thomas James Nelson took up the cause of the local authorities. Nelson, who was himself Chairman of the Hampton Wick Local Board, also held the influential post of Solicitor to the City of London. He was both an experienced lawyer and a politically astute operator. When the Conservatives won the general election in February 1874 and Benjamin Disraeli, with whom Nelson was personally acquainted, became Prime Minister the former saw his opportunity. Nelson wrote a pamphlet entitled *An Incredible Story* which took the form of a letter addressed personally to Disraeli explaining the dilemma faced by local authorities in their attempts to conform with current sanitary legislation. In an eminently readable narrative with a well-balanced mixture of fact, humour and incredulity, Nelson recounted the background and history of the problems now faced by a local authority and the barriers standing between them and a successful resolution.

To what degree his efforts were successful will probably never be known but the following year the Conservative Government

passed the *Public Health Act 1875* which both allowed an authority to establish sewage treatment works in an *adjoining* district and, crucially, permitted a number of authorities to *act in combination* and share the expenses between them.

The Act received Royal Assent in August 1875 and the Surbiton Improvement Commissioners lost no time in trying to exploit the new option for combination. Having employed Bazalgette (now Sir Joseph Bazalgette) as their Consultant Engineer, the Commissioners proposed to implement his scheme which combined no fewer than 67 communities from Eton in the west to Croydon in the east and from Ealing in the north to Epsom in the south into a United District with a combined population of almost 350,000. The scheme's main sewer started at Eton with the sewage flowing by gravity to a point near New Malden with six arterial sewers joining along the way. The sewage so far collected from a population of 240,000 was then raised, by pumping, 50ft into a higher sewer along which it flowed by gravitation to a point near Mitcham receiving along the way the sewage of nine further communities. Having been raised again by 96ft the sewage finally flowed by gravity to Beckenham where it was received into the sewers of the West Kent Drainage Company. During the 1875 parliamentary session the WKDC had obtained powers for a scheme - also designed by Sir Joseph - to construct a main sewer from Beckenham to the Thames to drain the Cray valley towns. It was now proposed to enlarge that sewer to provide the capacity to receive the sewage from Surbiton's proposed United District.

The Public Inquiry on the Surbiton scheme was opened on 2<sup>nd</sup> November 1875 in the Improvement Commissioners offices but, with so many interested parties wishing to attend, it was reconvened in the *Surveyor's Institute* in Westminster and ran from 18-23 November. The report by the Inspector Lieut.-Col. J Ponsonby Cox had been completed by 18 January 1876 but for some unknown reason its publication was delayed until mid-April. In his report Cox accepted the overall viability of the scheme but questioned the assumption that every community in the United District would be eager to join, pointing out that many had already completed - or were well advanced with - their own schemes.

His overall conclusion was:

*though I am prepared to admit that there are difficulties existing in a greater or lesser degree through the whole "united district", ... I do not consider that they are so great as to require for their solution quite so heroic a treatment as that proposed.*

Cox then pointed out that, although the Thames Conservators were entitled under their Act to demand the same standard effluent purity both above and below the London Water Companies' intakes at Hampton, he did not believe they had ever in practice demanded this *below* the intakes and if they did, no court would uphold them. Referring to the 16 places between Hampton and the western boundary of the metropolitan district he advised

*The best mode of dealing with the sewage of these towns appears ... to be by means of precipitation works, and it is in this direction that the efforts of the local authorities of these places should be directed.*

In his final paragraph, Cox pointed to a way forward:

*Should application be made, the (Local Government) Board should facilitate the combination of (these) districts ... for the purpose of jointly establishing works for the purification of the sewage of those districts.*

When the report was finally made available it triggered a series of events that resulted in the implementation of Cox's suggestion. The catalyst was the move by the Thames Conservancy, following the demise of the Surbiton scheme, to impose their threatened penalties for non-compliance with their demands that all sewage be diverted from the river by 1<sup>st</sup> July! Their first target was Hampton Wick on whom they threatened to impose a fine of £98,000. Since the whole rateable value of Hampton Wick was only about £11,000 a year and the proposed penalties were not far off the freehold value of the property of the entire parish, the chairman of the Local Board Thomas Nelson felt there was nothing to be lost and decided to take the lead in forming a Joint Board to implement Cox's suggestion. After a stormy meeting of the Local Board held on 7<sup>th</sup> June 1876 where he failed to convince his fellow Board Members to back his proposal for a Joint Board, Nelson stormed out and immediately set to work on a pamphlet addressed to his fellow local authority chairmen in which he asked

*What is the use of our boasting of local self-government as one of the pillars of our liberties and as the training school for statesmen if we are unable to deal with such a question as this? Is the health of the places committed to our charge of no importance, and can those of us who dwell in good houses with plenty of ground around us be insensible to the claims of our less fortunate neighbours who have the well and the cesspool in close contiguity, and can we calmly sit down and watch disease breaking out and spreading amongst them without remembering that when your neighbour's house is on fire your own is in peril?*

The pamphlet was completed, printed and published by 24<sup>th</sup> June 1876. The reaction to Nelson's proposal could best be described as "muted". Nelson had concluded his proposal by urging each authority to pass a resolution to apply to the LGB for the formation of a united sanitary district. In the event it seems that only his own Hampton Wick Local Board complied with his request. Twickenham whose own plans for a sewage system were well advanced declared themselves openly hostile whilst Kingston and Surbiton were still determined to implement their joint scheme for a precipitation works.

Nevertheless the Local Government Board were keen to gauge interest and instructed Lt.-Col. Cox to convene a public conference. Although this turned out to be a bad-tempered and unconstructive affair, nevertheless when Cox issued his report to the LGB on 3 March 1877 he solidly recommended in favour of the formation of a joint board from whom there would be almost no membership exclusions permitted. In July the LGB brought a Provisional Order before the Select Committee of the House of Lords setting up the *Lower Thames Valley Main Sewerage District*. Even at this stage, Twickenham and Kingston were still vigorously opposed to the Bill. At the very last minute, the Select Committee allowed Twickenham to escape from enforced combination but Kingston's last-ditch attempt to kill the bill altogether failed and it duly received Royal Assent on 10 August 1877 - almost 10 years to the day since a previous House of Lords Committee had recommended the formation of such a joint board.

The first meeting of the 29 members of the Joint Board took place on Wednesday 5<sup>th</sup> December 1877 in the Council Chamber Kingston. The attendees proceeded to elect Thomas James Nelson as their chairman. He was unopposed in the election and supported by all but one of the members present. Arguably Nelson was the obvious choice. Firstly, as the sole member of

one of the smallest authorities represented on the Joint Board, he was likely to be as neutral and objective a chairman as could be expected. Secondly, although only 51 years old, he was an outstandingly able lawyer and his position as Solicitor to the City of London - which he had held since 1862 - made him both well-informed and well-connected with national government affairs in general and the workings of the Thames Conservators in particular. Thirdly, Nelson's continual awareness of the conduct and affairs of his immediate neighbours on the Kingston Town Council (a body which was still deeply and openly opposed to the very existence of the Joint Board) would have been seen as a source of reassurance to the Richmond and Surbiton authorities who had little reason to trust Kingston.

Nelson remained chairman of the Lower Thames Valley Main Sewerage Board until his death in February 1885, just six months before the LTVMSB itself was dissolved. He continued

to update *An Incredible Story*, which had started as an open letter to Disraeli in 1874, so that it became a living record of the activities and tribulations of the Joint Board. It is not clear to whom - if anybody - these updates were addressed but they serve to give a uniquely fascinating insight into the workings of a Victorian Sewerage Board from the perspective of its chairman. The fourth (and final) edition was published in August 1884 and ended on an optimistic note by recording that the Local Government Board had given their approval to the latest scheme.

Facsimiles of the original pages of the fourth edition are reproduced here.

*Left: Nelson in 1882*  
Courtesy of the National Portrait Gallery



SIR THOMAS JAMES ATKINSON  
THE CITY SOLICITOR

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# AN INCREDIBLE STORY,

ORIGINALLY TOLD IN A

## LETTER

TO

The Right Hon. the Earl of Beaconsfield, K. G.,

THEN PRIME MINISTER OF ENGLAND,

RE-WRITTEN AND FURTHER CONTINUED.

"Tis strange but true, for truth is always strange—  
Stranger than fiction."

*Don Juan, canto xiv, stan. 101.*

FOURTH EDITION.

1884.

## AN INCREDIBLE STORY.

OUR huge Metropolis, when it was still a small city, was supplied with water from natural springs rising in the hills on its northern side and carefully conveyed to fountains, or conduits, whence the inhabitants fetched it for use in their houses, after the primitive fashion prevailing in many continental towns to this day, and of which at least one example remains in England, the Cathedral City of Wells. King Henry VI., among his other good deeds, enlarged this supply by granting to the City, on the occasion of his marriage, the Conduit Mead, where the pure water welled up in abundance, the locality of which is still marked by the name of Conduit Street.

London grew in size and population, and the conduits in the beginning of the 17th century ceasing to be sufficient for the wants of the population, the public enterprise of Sir Hugh Middleton and other citizens, with the assistance of James I., conducted the springs at Anwell through the aqueduct of the New River, some forty miles in length, to supplement the supply. London, however, still continued to grow; but a subsequent generation, less nice than their ancestors, was content to have its water taken from the Thames at London Bridge, and afterwards from Battersea.

We had, meanwhile, been changing some of the habits of our forefathers, and amongst these changes was the introduction into our houses of the water-closet, a change made possible only by the increased quantity of water obtained by using the River Thames as a source of supply, but which

became its own Nemesis, for it fouled that river to such an extent that an irresistible cry for a remedy made itself heard.

In these circumstances a Royal Commission was issued to inquire into and report upon the Water Supply of the Metropolis, which was presided over by His Grace the Duke of Richmond. That Commission came to the conclusion that the Thames water was a suitable and good water for the use of the four million inhabitants of London, provided the contamination of the water by the passage of sewage into the river was stopped. It would be foreign to the purpose of this story to inquire whether this was a sound conclusion (about which much may be said, as the Thames is, and will always remain, a navigable river), it is sufficient to say that the report was made and acted upon.

Before this report, however, the sewage of the Metropolis itself, flowing and reflowing as it did through London with the ebb and flow of the tide, had become so much a nuisance to the Metropolis, that its outfall into the river had been removed from London by the Metropolitan Board of Works, specially called into existence for the purpose, to a point some few miles lower down the river. This happened none too soon; for one of the London water companies had long pumped this highly flavoured mixture from their works at Battersea for the use of such of the inhabitants of London as had the privilege of being within the area of their supply.

There remained to be dealt with the sewage of the places on the Thames above the Metropolis, from Lechlade to Putney, a distance of 140 miles, and as to these the Metropolis acted with great injustice, not to use any harsher words. Most of these places had been compelled, by the sanitary legislation then existing, to spend large sums of money in laying down a system of sewers, and carrying the outfall into the Thames.

No sooner, however, had the Duke of Richmond's Com-

mission reported in favour of the Thames supply than an Act of Parliament was passed, at the instigation of the Government, to compel these places, under heavy penalties, to discontinue the flow of sewage into the Thames; that is to say, they were to undo by law what the law had made them do. It was a very arbitrary step, and the more arbitrary as they were not told how otherwise the sewage was to be disposed of; but they were helpless. London insisted upon having the Thames as a source of supply for its water, the Thames Conservancy sold the right to take this water to the London water companies for some £6,000 a year (subsequently increased to £10,000), and thus London and the Thames Conservators treated the Thames above London as their property, irrespective of any injustice they dealt out to the towns above London, or the endless trouble they imposed upon the local authorities or the heavy burdens they put upon the ratepayers of those towns. The value of the water when pure might at least have gone in relief of that taxation which was to be spent in making it pure instead of being paid to the Conservators.

It seems almost incredible that this legislation should have passed without sufficient powers being conferred upon these unfortunate places to dispose otherwise of their sewage when it was taken out of the Thames; but they were weak and scattered; the water companies, the Metropolis, and the Thames Conservancy were wealthy, strong, and united, and the weak, as usual, went to the wall. It is true that the Select Committee of the House of Commons, to which the Bill was sent were so struck with the difficulties these places would be placed in, that they made a special report on the subject so far as some of them near London were concerned, but it fell unheeded by any one who could give effect to it. If a Chinaman wandering to the Fiji Islands had had his tail cut off through some humble official of the Government

mistaking his instructions or duties, he would no doubt have found an advocate in Parliament; but the grievous wrongs of the subjects of Her Majesty in England itself are much more difficult of redress, as this story will show.

However, so it was, and in 1867 all passage of sewage into the river, except that of London itself, was forbidden, at the instance of London, under a penalty of £100 a day on the offender.

No time was lost by those affected in rendering obedience. Kingston led off. Before the Act had passed even, that town had been attacked in Chancery by the Conservators; and expecting little mercy at their hands, the authorities looked about them and found a spot admirably adapted, as they believed, to deal with their sewage and that of their immediate neighbours, by passing it over and through a porous soil at Ham, within their own parish.

Application was made to the Government to sanction this, and the official inquiry was duly held in March, 1869. Kingston, however, had not before tasted of the pleasures of sewage questions: a host of objectors, neighbouring residents, appeared, and after spending nearly £900 in the cost of the inquiry, the Government refused to allow the scheme to be proceeded with. Many influential persons resided in the neighbourhood, and it has always been said that back-stairs influence prevailed against the sanitary claims of Kingston. All the good Kingston took from their attempt to comply with the law was, that a special rate had to be made on the inhabitants to pay the £900 thus absolutely thrown away.

Next Richmond appeared upon the scene. Richmond before it took its sewage into the Thames, in obedience to the law, had desired to utilise it on some land belonging to the Crown called the Old Deer Park, but had been refused permission; it had now to take it out of the Thames after spending £20,000 to put it in! For this purpose it turned its attention to some

land between Wimbledon and Malden ; an official inquiry was held in January, 1871, again a host of objectors appeared, and the Government refused permission. Thus all the advance that Richmond had made was to incur a perfectly useless expenditure of £200 in the cost of the inquiry, which had, as usual, to be borne by the unfortunate ratepayers.

Kingston then made another attempt. Determined this time not to be defeated by landowners' opposition, it purchased a hundred acres of land between Walton and Moulsey, and arranged for the neighbouring local authorities at Surbiton and Hampton Wick to join with it in taking their sewage there. This time it had only to obtain the permission of the Local Government Board to borrow the necessary money to construct the sewers.

Again the official inquiry was held in May, 1872, again objectors appeared, again the Government refused the application, again the unfortunate ratepayers had to pay the costs of the inquiry, but this time with an additional burden, for they had to pay for the land where the sewage was to be purified, and which remains on their hands to this day !

Next Richmond was summoned by the Conservators of the Thames for the penalties they had incurred in breaking the law by allowing their sewage still to flow into the river. It was to no purpose they pleaded that the sewage from some thousands of inhabitants would not stop flowing day by day into the river, that they had tried in vain to get land upon which to divert it, and that it would not evaporate into the air ; the magistrates fined them, of course according to law, and the Court of Queen's Bench upheld the conviction, of course according to law. The unfortunate ratepayers had to pay the penalty and costs, but the Richmond sewage flows into the Thames to this day, for there are some things which even an Act of Parliament cannot do.

Richmond next applied to Mr. Gore, the official in charge

of the Crown Lands, and said to him, We are surrounded on all sides by Her Majesty's property ; the Government will not let us have land away from our town on which to put our sewage, let us have a part of the Old Deer Park on which to purify it ; but Mr. Gore turned a deaf ear to the appeal. Richmond then applied for and obtained—of course after an expensive fight and at the expense of the ratepayers—a special Act of Parliament relieving them for a given time from further penalties, and by way of diversity, they had an expensive arbitration with the Thames Conservancy for further time, which the Board of Trade gave them ; but at the expiration of the time the sewage still flowed into the Thames.

Nor were Kingston and Richmond the only bodies desirous of complying with the law. Barnes, Mortlake, and Kew made an application to take land dealing with their sewage at a spot within their own limits. The inquiry was held in July, 1874, and the application as usual was refused with a charge exceeding £500 for the ratepayers to pay.

Hampton Wick also applied to be allowed to join the scheme of the Office of Works providing in their parish for the sewage of Hampton Court Palace, but in vain.

Kew in January, 1877, enjoyed the luxury of a separate application of its own for another spot of land which was refused, and the useless cost of £110 paid by the ratepayers.

In 1877 Barnes and Mortlake tried again for some land by the Soap Works at Barnes, this time without Kew ; the application was refused, and the cost, £600, again paid by the helpless inhabitants.

In the same year Esher made an application, also refused, leaving as its only result £665 to be paid by the ratepayers.

In that same year also the large Local Government district of Heston and Isleworth, which embraces Hounslow and includes 6,000 acres, made application for a system of their own, and met with the universal fate—refusal, at a cost to the

ratepayers of £263. These facts will all be found in a return printed by order of the House of Commons (1881, No. 112).

It is thus seen that most of the places near the Metropolis honestly endeavoured to obey the law, and their endeavours met with the invariable result, failure to obtain from the Government the power to carry out what the local authorities had proposed, and without which powers the sewers could not be diverted from the Thames, whilst a heavy and wholly wasted expenditure was imposed upon the unfortunate ratepayers.

One place, and one place alone, made an application which was granted, but never carried out. Richmond obtained in May, 1873, an order of the Local Government Board to deal with their sewage by precipitation. They preferred, however, on further consideration, to throw away the £442 which this cost the ratepayers to carrying out the scheme, for at that time no place had successfully dealt with the difficulty of getting rid of the deposit technically called "sludge."

The large and rising village of Wimbledon was in equal difficulties with other places. It is true their sewage did not go into the Thames, but they wanted an outlet for their sewage; and failing to get one nearer at hand, an eminent engineer resident there, Sir Joseph Bazalgette, came to their help, and proposed a scheme by which all the places in the Thames Valley were to be joined in union to take their sewage to Bagshot Heath. Sir Henry Peek, then as now Member for Mid-Surrey, took the Chair at a public meeting at Kingston to hear this scheme explained, and he probably remembers to this day the noisy opposition that was made to it by some gentlemen who thought themselves injuriously affected by it. It fell of course to the ground, as all proposals have done.

At last, after ten years of these fruitless inquiries and wasted expenditure, and when the matter was becoming not only a scandal but a serious sanitary grievance, for no new houses could be connected with the sewers and no sewers

could be made in places that had them not, the population all the while increasing at a rapid rate in the valley of the Thames—the Surbiton Improvement Commissioners plucked up courage to apply to the Local Government Board for a comprehensive scheme. They asked that all the places in the Thames Valley, between Windsor and London, should be formed into a Joint Sewage Board, that their sewage might be taken out of the Thames above London and taken to an outfall near to the sea suggested by Sir Joseph Bazalgette. The Local Government Board duly held the inquiry through Colonel Ponsonby Cox, R.E., one of their Inspectors. All these places were represented at the inquiry. The evidence given before him of the insanitary state of the district was overwhelming and unchallenged, as also of the utter and hopeless failure of every local authority to obtain power to obey the law by making other provision for its sewage than allowing it to go into the Thames. Colonel Cox sat many days, examined many witnesses, heard many learned counsel, and reported to the Government that the remedy proposed was too heroic, but that a combination of less magnitude should be made, viz., of the places between Hampton and London. This report created great public interest. It was laid before Parliament, but the Local Government Board determined not to create the Joint Sewage Board; and so the Surbiton Improvement Commissioners retired from the field with the usual but only certain result of every attempt to provide for sewage—a call upon their unfortunate ratepayers for the costs, and to find themselves in the old situation, "as you were."

The Thames Conservators now appeared upon the scene again, with a determined front. They had held their hands during the time the Surbiton application was pending, but no sooner was the result made known than they took proceedings to recover the penalties against the various places. Their

hand first fell upon the smallest and most helpless of them all, Hampton Wick. It was not a very valorous proceeding, for of the 1,850 acres comprising Hampton Wick, 1,200 belong to the Crown, and the representatives of the Crown—the dominant landowner—had, as in the case of Richmond, refused to give any facility to the Local Board to divert its sewage from the river. Hampton Wick was summoned for penalties amounting to £98,000!!! The whole rateable value of Hampton Wick is about £11,000 a year, and as it principally consists of small property, the penalties were not far off the fee simple value of the entire parish. In these circumstances the Local Board took a desperate step. If their parish was to be depopulated and the place turned into a desert by its seizure and sale for these penalties, at least they would venture the gambler's chance. Hampton Wick applied to the Local Government Board to form a Joint Board on the basis recommended by Colonel Cox. They knew the penalty of failure—a few more hundreds added to the £98,000 if they lost. The battle began. The day was fixed for the inquiry at the Town Hall, Kingston. Some ten learned counsel appeared as usual to oppose the order being made, but for the first time in this long history a local authority scored. The temerity of Hampton Wick was rewarded, and the order was actually made; it had yet to undergo the ordeal of Parliament, and there the battle was renewed; but it ultimately became law that there should be a Joint Board, comprising all the places between Hampton and London, except Brentford and Twickenham. Brentford was omitted by the Local Government Board, and Twickenham was left out by the House of Lords. But a sufficiently comprehensive and important Board was formed to deal with this thorny subject, for it comprised some forty-five square miles of country, twelve miles long by eight in width. All the Local Boards were relieved of their penalties and their duties about sewage;

three years from Michaelmas, 1877, was given to the Joint Board to accomplish its work, and the penalties for going into the Thames were suspended during that time, and not to be enforced if the work was done.

At last all who had laboured so long on this subject and the worried inhabitants thought they saw daylight after many weary years of struggling. The constituent authorities proceeded to elect their representatives at the Joint Board, and men of influence and position in the district willingly undertook the labour of solving the difficult problem, in fact, a stronger Board probably never sat down to make their lives wretched about sewage problems. The presence there of Mr. Leicester Penrhyn, the Chairman of Quarter Sessions for the County of Surrey; of Mr. Shrubsole, the Mayor of Kingston; of Sir Francis Burdett, the Chairman of the Richmond Vestry; of Mr. Dickens, the Chairman of the Surbiton Improvement Commissioners; of Sir Thomas Nelson, the City Solicitor; of Mr. Meason, the Chairman of the Local Board of Heston and Isleworth; of General Sir Orfeur Cavenagh, a distinguished officer of Engineers; in short, of the heads of every local authority save one, of some ten or twelve magistrates, and of the vicars of two of the parishes, was a sufficient proof that the spirit of patriotism was not extinct in the Lower Thames Valley. They met first in December, 1877, too late to be ready for the next session of Parliament, as the time for giving the necessary notices was already passed, but they lost no time in setting about their task. As soon as they had appointed a clerk they ascertained the wants for which they had to provide, and reducing these into a business shape, they sent them to every engineer of eminence, and invited them to suggest the best thing to be done with the sewage of the district. Some eighteen responded to this call, amongst them Sir Joseph Bazalgette, the Engineer to the Metropolitan Board of Works; Colonel

Haywood, the Engineer to the City of London; Mr. Baily Denton, Mr. Mansergh, Mr. Shields, and other well-known names. As some sent in alternative plans, the Board had no less than twenty-three to consider. They took a very practical step when they obtained them. They asked a civil engineer unconnected with any of the competitors to analyse all the schemes, and taking one common standard of value to ascertain the cost of each, but upon the merits of the schemes he was to give no opinion. Having obtained this report, it was, with the schemes, printed, and copies furnished to every member of the Board.

The Board, aided by this report, met to consider these schemes in October, 1878. Beyond the time each member had given to their consideration in private, a whole day was devoted to their public discussion, and ultimately four were selected for further and detailed examination ; all four schemes were for disposing of the sewage by irrigation or filtration through land, and they all involved the acquisition of land for that purpose and for the pumping stations. A Special Committee, chosen by ballot, was appointed for this examination. They presented a unanimous report to the Board, after visiting the sites, recommending one of those four to be carried out, that proposed by Colonel Haywood, the Engineer to the City of London, and with which report the Board unanimously agreed, and resolved to carry out his scheme. Now this Board was not an ordinary assembly, membership added nothing to social position, no combination of letters could be added to names, it was neither a municipal corporation nor a Local Board, its Chairman was not dignified by being called a mayor, or its members aldermen or councillors ; they were associated together to perform a task which for more than a decade had baffled all the local authorities in their district—the relief of the Thames from the sewage of so much of a population of 120,000 persons as used it, and providing means of sewage

for the rest who had no sewers, and if they succeeded their only reward would be the approval of their own consciences. They travelled to and fro over considerable distances at their own expense, and if their duties detained them so as to make refreshment necessary, they provided it out of their own pockets. What their duties were there could be no manner of doubt about. The Provisional Order of the 5th of June, 1877, made by the Local Government Board under the powers of the Public Health Act, 1875, and afterwards confirmed by the Statute 40 and 41 Vic., c. 229, by which they were constituted as "The Lower Thames Valley Main Sewerage Board," expressly declared the purposes in Article X. as follows :—

- (a) "For making and maintaining a main sewer or sewers for the use of and for the reception of the sewage from the sewers of the several Urban Sanitary Districts and contributory places mentioned in the schedules hereto.
- (b) "For erecting, making, maintaining, and working such machinery and plant as may be required for the above purpose, or for conveying the sewage of the United District to a convenient place or places where it may be purified, if necessary, by application to land or otherwise in such manner that it may be discharged into any stream, river, or water-course without breach of the Rivers Pollution Prevention Act, 1876, or of the Thames Conservancy Acts, or of any other provisions of the law ; and it shall be the duty of the Joint Board to carry out and perform the purposes for which the United District is formed within a period of three years from the commencement of this order, and in default of their so doing they shall be deemed to be a local authority which has made default in providing their district with sufficient sewers within the meaning of Section 299 of the Public Health Act, 1875."

In fact the Board was formed for the one sole purpose of providing for the sewage of the various Urban and Rural Sanitary Authorities comprised in their district, so as to comply with the provisions of the law against the Pollution of the River Thames, an object which, as has been shown, had long baffled the separate local authorities.

When the Board, having chosen their plan, proceeded to consider what powers they required to carry it out, they were of opinion that as the plan proposed to deal with the sewage upon land in the parishes of East and West Moulsey, Walton-upon-Thames, and Thames Ditton, and as a great part of that land was intersected by two rivers, the Mole and the Ember, upon which there were dams, mills, and weirs, and as these rivers were, in consequence of these obstructions, liable to overflow their banks, and thus flood part of the land upon which the sewage was to be placed, it was imperatively necessary to acquire those mills, part of the bed and soil of the Rivers Ember and Mole, and the rights in the water of the River Mole which certain persons claimed to possess as far as Cobham Bridge, a distance of about five miles above the boundary of the land proposed to be taken. The possession of these mills and water rights would have served three purposes : first, it would have prevented litigation otherwise certain to have occurred between the mill-owners and the Board, as the one would want to keep the water up and the other to discharge it ; secondly, the water power of the Mole might have been economically utilised as auxiliary to steam power for pumping the sewage on to the land ; and thirdly, it was absolutely necessary to straighten and deepen part of the River Ember to carry off the flood waters and also the effluent water from the land to be acquired by the Board. Now, the Public Health Act had given power to the Local Government Board by Provisional Order to authorise the compulsory purchase of land, but it had already been decided

by the House of Lords that this power did not extend to authorise the acquisition of water rights.

This happened in the case of a Provisional Order made on the 5th June, 1877, by the Local Government Board upon the application of the West Houghton Local Board, being the sanitary authority for the Urban Sanitary District of West Houghton, in the County of Lancaster, authorising that Board to put in force the powers of the Lands Clauses Consolidation Act with respect to the purchase and taking of lands otherwise than by agreement, and also certain water and water rights, and a Bill was introduced into the House of Lords in the Session of 1877 by the Earl of Jersey, representing the Local Government Board, to confirm that and other Provisional Orders.

Amongst the owners of property affected by that order were Charles Joseph Stonor, Esquire, James Fleming, Esquire, one of Her Majesty's Counsel, and Sir Charles Frederick Smythe, Baronet, who being advised by eminent counsel that such Provisional Order was *ultra vires* on the ground that it included water rights, presented a Petition to the House of Lords against its confirmation.

In consequence of the presentation of that Petition, the Bill was referred, as required by the Public Health Act, 1875, to a Select Committee of the House of Lords, consisting of the Earl of Cowper, Viscount Powerscourt, and Lords Hatherton, Seaton, and Raglan, and the Petitioners appeared before that Committee on the 16th day of July, 1877, and took the objections raised in their Petition, that the Provisional Order was *ultra vires*. The Committee after hearing Counsel on both sides, and after consulting Lord Redesdale, the Chairman of Committees, upheld the objection of the Petitioners, and struck the West Houghton Order out of the confirming Bill.

It was clear after that decision that an application for a Pro-

visional Order to take water rights would be useless. But the Joint Sewerage Board had another difficulty. By the Act confirming the Provisional Order establishing the Joint Board it was enacted (Sec. 3), "That no works shall be commenced by the Joint Board upon the bed, shore, or banks of the River Thames without the consent, in writing, of the Conservators of the River Thames, signified under their Corporate Seal, and any works constructed upon such bed, shore, or banks shall be executed according to a plan and section, and upon a site to be approved in writing by the Conservators of the River Thames under their Corporate Seal and deposited at their office."

The plan of Mr. Haywood adopted by the Joint Board rendered it necessary to convey the sewage of the constituent places situate in the County of Middlesex across the River Thames in conduits or syphons at three different places, namely, at Asgill Lane, Richmond, to accommodate the sewage of the Heston and Isleworth Local Board, at Ham Fields for the sewage of Teddington and of Hampton Wick, and at a point between Hampton Court and Hampton for the sewage of those last mentioned places. Application was made to the Conservators of the River Thames for their consent to these works, but it was not given, and it was clear that without it the scheme could not be carried out, because as the restriction against works upon the bed, shore, or banks of the River Thames having been inserted in Parliament in the confirming Act, the Local Government Board had no authority by Provisional Order to repeal it. All the plans sent in to the Joint Board save one involved crossing the River Thames, as the district of the Joint Board is intersected by that river.

The Lambeth Waterworks Company and the Chelsea Waterworks Company each drew the water which they supplied for the use of the Metropolis from the River Thames

at a point between Kingston and the mouth of the River Ember, known as Seething Wells. In 1871 the Lambeth Company obtained an Act of Parliament authorising them to remove their intake to a part of the River Thames above the junction of the Mole with the Thames, and which is some two miles above the mouth of the River Ember; and in 1875 the Chelsea Company also obtained an Act of Parliament to remove their intake to a spot above and adjoining the new intake of the Lambeth Company. These new intakes and the necessary works in connection therewith were completed and made use of some time before the Joint Board had adopted Mr. Haywood's scheme. So soon as it was known that the Joint Board had adopted that scheme, letters appeared in the *Times* newspaper, alleging that Mr. Haywood's scheme would foul the water supplied by those two Water Companies to the Metropolis, because the effluent water from the land upon which the sewage was to be purified would flow into the River Thames through the River Ember at a point above the intakes of those two Water Companies. These letters were answered by the Chairman of the Board, in which he pointed out that the Companies having, in order to obtain a purer supply of water at the instance of the Public Health Authorities, removed their intakes to West Moulsey, so as to avoid the dirty water of the River Mole, would never again make use of their disused intakes lower down; but the Joint Board were convinced that whatever the motives of the outcry the possibility of their effluent water reaching the Metropolis through the negligence of the Water Companies would probably prove fatal to their scheme, because it is recorded that one Water Company had continued the use of their intake at Battersea after they had apparently removed to Seething Wells; and so the Joint Board determined in applying for their Act of Parliament to include in it a prohibition against the two Water Companies

using their disused intakes for the purpose of sending water to the Metropolis. The Local Government Board had and have no authority by Provisional Order to repeal or vary the private Acts of the two Water Companies.

There were therefore three things for which the Joint Board, in *bond fide* carrying out their duty, required the assistance of Parliament, as before set out in detail, viz. : the acquisition of water and water rights, the works across the River Thames, and the closing of the disused intakes of the Lambeth and Chelsea Waterworks Companies, of which the two first were absolutely necessary, and the third was most desirable, to carry out the duty imposed upon them.

Sir Thomas Nelson, the City Solicitor, was then the Chairman of the Joint Board, and had had a long Parliamentary experience.

The late Mr. Henry Shrubsole, of Surbiton Hall, Kingston, was then serving the office of Mayor of the borough of Kingston-on-Thames, and as such was an *ex-officio* member of the Joint Board. He had for many years been a partner in the firm of "Dyson & Co.," a well-known and old-established firm of Parliamentary Agents with very large experience. This firm had been professionally engaged for the opponents in the West Houghton case, and knowing that case, both he and the Chairman were of opinion that a direct application for a Bill to Parliament was the proper and only course for the Joint Board to take to obtain the power they required to carry out the selected scheme imposed upon them.

To Parliament accordingly the Board determined to go, in the full belief that it was their clear course of duty, that they were acting for the best interests of the ratepayers of the district, and taking the cheapest and most expeditious course to accomplish the purpose for which they were constituted, and the soundness of their judgment has been abundantly proved by subsequent events.

Their scheme met with the usual opposition. Next to contests about religion there is nothing which waxes so warm as a sewage fight ; orators grow apace and become diffuse and excited on this subject, and when much talking is done facts often have a struggle for life, and if the facts do not fit the oratory so much the worse for the facts. The chosen scheme of the Joint Board, the elected representatives of the district, was no exception to the usual rule. After much agitation some 294 persons in the district, out of a population of 110,000, petitioned against the Bill ; and neighbouring land-owners, who thought the value of their property or the amenities of their residences might be affected by the execution of the scheme, made their influence felt in Parliament, and notably they frightened the frequenters of the Sandown racecourse into the belief that the proximity of the land where the sewage was to be treated to that place of fashionable amusement might cause it to fall out of favour. The second reading of the Bill was opposed in the House of Commons, and although the President of the Local Government Board, speaking as the responsible Minister of the Crown on a subject in his department, told the House that the Bill was a *bond fide* attempt to carry out the duty cast upon the Joint Board, and that he should feel it his duty to vote for the second reading, and although Lord George Hamilton, another member of the Government, speaking as one of the members for Middlesex, in which much of the district was situate, asked that the Bill might be read a second time, the Bill was lost on a division by 168 noes to 146 ayes.

Thus the Lower Thames Valley was found in this incredible position—the local authorities are required by law, and under severe penalties, to divert the sewage of their respective districts from the Thames. One district after another has produced schemes for obeying the law which have been impartially stifled by the Local Government Board when

their authority for carrying them out was asked for, except in the case of Richmond, which did not carry out the scheme.

It mattered absolutely nothing what the unfortunate district proposed, whether total diversion, irrigation, downward filtration, precipitation, or chemical treatment, nor whether the place of treatment was in the district or out of the district, opponents always appeared, and they always succeeded in preventing the local authority carrying out its plans.

At last came the formation of the Joint Board. They took up the onerous and ungrateful burden of carrying out the orders of the Legislature. Nor did they walk in the dark ; the Local Government Board had issued for the guidance of all sanitary authorities the report of a Commission of most able men, who after an exhaustive examination of the various plans in operation, both in England and on the Continent, united in renewing the recommendation of former Royal Commissions that irrigation on land was the best and safest mode of dealing with sewage.

The Joint Board acted on this authoritative advice ; their engineer was an able and competent adviser—Colonel Haywood, the Engineer of the City of London. He was assisted by another engineer well-known in sanitary matters, Mr. Peregrine Birch. One of Colonel Haywood's competitors for dealing with the sewage of the Joint Board, Mr. Mansergh, C.E., to his great honour, made an independent examination into Mr. Haywood's scheme, after the rejection of his own, and gave it his cordial support. Other eminent engineers, agriculturists, and sanitarians—Sir John Coode, C.E. ; Professor Frankland ; Dr. Tidy ; Colonel Jones, V.C., C.E. ; Edwin Chadwick, C.B. ; Baldwin Latham, C.E. ; Hawksley, C.E. ; Grantham, C.E. ; Chalmers Morton ; G. J. Symonds ; Professor Ansted, Dr. Alfred Carpenter, Dr. Hill, of Birmingham ; Mr. Clare Sewell Read, and Buchanan, C.E., expressed opinions favourable to the scheme, and were prepared to

testify in its support ; as did also Mr. Ripley, C.E., the assistant of the late Mr. Menzies, in successfully dealing with the sewage of Windsor Castle and of Eton.

With all this care, precaution, and advice, the Joint Board failed in accomplishing the one purpose only for which they existed just as the separate sanitary authorities had failed, and so one more failure was added to the twelve long years of controversy and trouble about this sewage question, during which some of the local authorities had twice approached the Ministers of the Crown, in the hope of obtaining relief. Once they were received by Mr. Bruce (now Lord Aberdare) when at the Home Office, before the care of the public health was transferred to the Local Government Board, and once they have been to Mr. Sclater-Booth. They were received with the courtesy which Ministers always show to deputations introduced by their Members, but the promises of consideration of their case have borne no fruit, and now, after seventeen years of weary struggling, and wearied hours, things are as they were, for the sewage still goes into the Thames.

But the Board were not disheartened. After the loss of their Bill upon its second reading without any inquiry into its merits, the Joint Board reconsidered their position ; a majority were still of opinion that Mr. Haywood's scheme offered the only solution of the sewage problem in their district, and they resolved again to endeavour to obtain power to carry it into effect. No sooner was this decision known than an information was filed in the Court of Chancery by the Attorney-General at the instance of an opponent of this scheme to restrain the Board paying the cost of their unsuccessful application to Parliament, in the hope that they would thereby be coerced into not proceeding with Mr. Haywood's scheme. The intimidation failed, but the Chancery proceedings had this effect, that the members of the Board were naturally not willing to become personally liable for expenses

incurred in carrying out the duty imposed upon them, and so they determined to apply to the Local Government Board for such powers as that Board could legally give them by Provisional Order, in the hope that if the Provisional Order was made, that the other powers would thereafter be obtained from Parliament.

The application being made, it was referred as usual to an Inspector to examine into. The inquiry commenced on the 24th of February, 1880, and closed on the 6th May, the Inspector having sat for forty-five days, during which he examined eighty witnesses and heard fifteen Counsel and six Solicitors in opposition to the scheme.

This inquiry cost the unfortunate ratepayers of the district, to be exact, £11,699 13s. 6d., exclusive of Colonel Haywood's charges, which are in dispute, amounting to £7,937, and has met with the same fate as all preceding inquiries—a refusal to make the order, accompanied by the recommendation to adopt the scheme of Sir Joseph Bazalgette, which the Local Government Board refused to sanction a few years back; but the hardest fate of all was that the absence of power to take water rights was made one of the reasons for not granting the application. Who shall say that truth is not stranger than fiction?

But the troubles of the Joint Board were not then ended. It has been stated that proceedings in Chancery were commenced to restrain the Joint Board paying the costs of their unsuccessful application to Parliament; and upon this the Master of the Rolls made an order for an injunction until the hearing of the cause. When the refusal of the Provisional Order was known, the Board thought it a waste of money to have the litigation continued, and an order was made by consent of the Plaintiff with the approval of the Local Government Board staying the proceedings, the ratepayers as usual paying the costs of all parties. This has been done, and they come to

£987 14s. 1d. This left the question of how the Parliamentary costs were legally to be defrayed still to be settled. There was but one straightforward course, to obtain authority from Parliament to pay them. There were plenty of precedents for this. The Metropolitan Board of Works incurred several thousands of pounds expenses in going to Parliament to seek a fresh supply of water for London. They were volunteers in that proposal, being under no obligation to do anything of the kind; the auditor disallowed their expenses, but Parliament passed a Bill authorising them to be paid. Again, in 1877 the 33rd clause of the Metropolis Toll Bridges Act enabled the costs of a preceding application to Parliament to be paid, although in this matter also the Metropolitan Board of Works had no duty in respect of freeing those bridges from toll. So in the West Houghton case the costs of the Provisional Order to take water rights, which the House of Lords had, as before stated, thrown out, were authorised to be paid. In 1855, in the case of the supply of water to Glasgow, the costs of an unsuccessful application to Parliament were authorised to be paid out of the rates. In the Glasgow Bridges Act, 1866, a similar power was given, and so in the Edinburgh and District Water Act, 1874, there is a similar power.

None of these cases stood upon so high a footing as the Joint Board's application. "It shall be their duty," said the Act of Parliament constituting them to carry out the main sewerage of their district. Whatever steps they *bond fide* took with an honest desire to discharge this duty are fairly chargeable upon the ratepayers of their district, and so the overwhelming majority of them thought.

There was, in fact, but one opponent of their Bill to defray these expenses—the Local Board of East Mousley. It was in the proximity of that place that the sewage was to be disposed of, and animosities were very strong. The Bill originated in the House of Lords, and they presented a peti-

tion praying that the Bill "might not pass," but not asking, in the usual way, to be heard against it. It was, therefore, an unopposed Bill. The Local Government Board made a report in favour of the Bill, but with certain suggestions as to verbal alterations in the clauses, which were at once assented to; but Lord Redesdale refused to allow the Bill to pass, and by his fiat alone it was stayed, the reason given by his Lordship being that other public bodies would be making similar applications if this were allowed.

So ended the Session of 1881. The Board had not only failed to advance one step in providing for the sewage of their district, but found themselves unable to pay their creditors, increased by the cost of another application to Parliament.

They had, however, amidst these troubles not forgotten the duty for which they existed, and having learned from the public press that the Metropolitan Board of Works were about to spend a very large sum of money—about three-quarters of a million—in improving their sewage system on the southern side of the Metropolis, they unanimously requested their Chairman to address a letter to Sir James Hogg, the Chairman of the Board of Works, asking that, in re-arranging this system of sewage, the Metropolitan Board would make provision for the main sewer of the Thames Valley Board passing through the Metropolis to their outfall at Crossness, and offering to pay whatever was fair as their share of the cost.

That request was refused by the Metropolitan Board of Works on the ground that they could only provide for the sewage of the Metropolis.

On receipt of this refusal they next determined to seek the advice of one of the most eminent of living engineers, who had taken no part in the previous competition—Mr. Thomas Hawksley. This happened on the 5th January, 1881, and, after careful consideration, he made a report, which was con-

sidered by the Joint Board on the 28th July, 1881, and unanimously agreed to.

The substance of this report was that the Joint Board should collect the sewage of their district at a point near Barnes Railway Station, and thence pump it through the Metropolis, along public highways, through Deptford and Greenwich, to a point in the River Thames near its confluence with the River Darent, just below Dartford.

Although this proposal was unanimously agreed to by the Joint Board, it involved the execution of works outside their district, and principally within the Metropolis. Now the Public Health Act expressly exempts the Metropolis from its provisions, and therefore the Local Government Board had no power by Provisional Order to authorise the main sewer of the Thames Valley Board passing through the Metropolis on its way to the mouth of the Darent. The Thames Valley Board therefore at once applied to the Local Government Board to know if they were prepared to obtain the necessary Parliamentary powers for this Board to carry out Mr. Hawksley's recommendations, and this the Local Government Board declined to do.

Considering the number of the local authorities, and the mass of underground sewers, water, gas, and telegraph pipes, the Board's sewer would have interfered with in its passage through the Metropolis to the Thames, it was an absolute impossibility to carry out the work without Parliamentary authority; and inasmuch as the Master of the Rolls had decided that whatever the necessities of the Board might be to go to Parliament to carry out their duties, they had no authority to apply to Parliament, the Board had but one course open to them, and that was to confess their inability to carry out Mr. Hawksley's recommendations.

Lastly, they turned their attention to the only remaining solution of their difficulty, and that was to deal with the sewage

by purification and precipitation within their own district. This system had hitherto found but few advocates at the Joint Board, because of the known difficulty of dealing with the precipitate, which is technically known as "sludge." Many places which had adopted the system had been obliged to abandon it, not being able to get rid of the sludge.

Quite recently, however, the ingenuity of an inventor has overcome this difficulty. The sludge is estimated to contain from 90 to 95 per cent. of water, and, in order to bring it into a portable form, the practice hitherto has been to spread it over the land and allow it to dry, the process taking a long time in our moist climate, and if the temperature be at all high, being at times an offensive one to the smell and at all times to the eye—black mud being not a picturesque object.

But this inventor has produced a press which, by means of atmospheric pressure, forces the sludge into a series of canvas holders, and squeezing out the greater part of the water, leaves the sludge to be taken out of these holders in the form of solid cakes, in which condition it is easily handled, and either taken to the land and used as manure or taken right away. Its operation may be seen at the Leyton Sewage Works in Essex, just outside London.

Messrs. Mansergh & Melliss, two eminent civil engineers, practised in the construction of sewage works, were accordingly instructed by the Board to see if the sewage of the district could be dealt with within their district by purification and precipitation, and to select a site where the sludge might be easily taken away if there were no demand for it on the spot for manure.

In the month of October, 1883, they presented a report to the Board, in which, after careful consideration, they recommended that no attempt should be made to deal with the sewage on several sites, but that, for reasons both of economy and efficiency, it should all be collected together at one spot. The three sites they indicated as suitable were,

one at Ham Fields, some market gardens at Mortlake, and a field in the parish of Barnes, near the Soap Works at Hammersmith Bridge.

The Board carefully considered these recommendations, and they came to the unanimous conclusion that, as the site at Ham Fields and the site at Barnes had both been the subject of previous inquiries, and refused by the Local Government Board, they had no option but to choose the site at Mortlake. This has been done, and the invariable outcry again commenced in opposition to the sewage being thus disposed of.

About two miles lower down the river, on the opposite bank, are the sewage works of the Local Board of Chiswick. The land taken for these works was the property of His Grace the Duke of Devonshire, and he voluntarily parted with it to the local authority for the purpose of relieving the parish of Chiswick from its sewage troubles.

These works are within 276 yards of the grounds of Chiswick House, His Grace's ancestral seat, and the house itself is only distant 420 yards from the works. This house is in the occupation of the Marquis of Bute, who has renewed his tenancy since the works have been in operation. With this example before them of sewage works being established without offence within so near a distance of such an historical residence as Chiswick House, the Board reasonably hoped that the objections taken to their proposed works would prove futile.

The occasion was, however, as usual taken advantage of by the critics and their abettors, who, notwithstanding all that had taken place, appeared in considerable numbers before the Inspector of the Local Government Board, when he held the inquiry prescribed by the Public Health Act. Mr. Harrison was again the inspector, and after a patient hearing, extending over fifteen days, in which counsel and witnesses were heard before him, the Local Government Board, upon careful consideration of his report, made the order asked for, and which now awaits

the sanction of Parliament. The order is carefully guarded by special provisions inserted by the Local Government Board, giving them not only a present but a continuing control over the works. This last inquiry has cost the unfortunate ratepayers about £4,000.

To make this history complete, it should be stated that, undeterred by the failure of their Bill in 1881, they again promoted a Bill in the following Session of Parliament, authorising them to pay the costs of their previous applications. This Bill was again opposed by East Moulsey, and being referred to a Select Committee of the House of Commons, was unanimously passed by them. It had again the misfortune to be opposed in the House of Commons itself, but got through finally without a division; and going up to the House of Lords, the decision of the Commons was not interfered with, but it became law, and the debts were paid.

It may not be uninteresting to note what the total expenditure incurred by the Board has been from first to last, without their having anything to show for it except the furniture of their Board Room :—

Paid competitors for first set of plans	...	£600	0	0
Paid Mr. Hawksley for his Report and				
advice	...	210	0	0
Costs of the Chancery suit	..	987	14	1
Costs of application to Parliament	...	2,804	5	2
Costs of application for Provisional Order	...	11,699	13	6
Costs of the Inquiry, 1884	...	4,000	0	0
		£19,751	12	9

Mr. Haywood's account, *in dispute*, for his services in support of applications to Parliament, and for Provisional Order, still outstanding and unsettled ...     ...     7,937   0   0

And that everything may be seen at one glance, there is recapitulated here what the various Local Authorities have spent for similar applications for Provisional Orders :—

Kingston Ham Inquiry in 1869	...	...	cost	£900
Richmond Malden Inquiry in 1871	...	...	"	200
Kingston (Walton Land) in 1872	...	...	"	200
Richmond in 1873	...	...	"	442
Barnes, Mortlake, and Kew in 1874	...	...	"	500
Kew alone in 1877	...	...	"	110
Barnes and Mortlake in 1877	...	...	"	600
Esher in 1877	...	...	"	665
Heston and Isleworth in 1877	...	...	"	268
				£3,880

## The Demise of the Joint Board

In Spring 1884 the Local Government Board held a Public Inquiry into the scheme devised by John Charles Melliss. The proposal was to bring the sewage of the whole district to a 44-acre site at Barnes where it would be processed using chemical precipitation. After a hearing lasting 15 days, the proposal was approved although the LGB imposed both conditions and their own ongoing control over the implementation. Notwithstanding this decision, by September 1884 the LGB, having received proposals from Kingston and Richmond that the Joint Board be dissolved, were canvassing opinions from all members as to whether they supported dissolution, separation or continuance.

Meanwhile a previously rejected scheme was also back in contention. From soon after the LTVMSB was formed, the Local Government Board had frequently recommended they consider joining the West Kent Drainage Scheme. Devised by Sir Joseph Bazalgette and originally opened in 1878, the scheme consisted of a sewer 9 miles in length from Beckenham to an outfall in Dartford Marshes, Long Reach, 7 miles below the northern and southern outfalls of the Metropolitan drainage system. After each scheme proposed by the LTVMSB had been rejected by the LGB, Bazalgette would write to propose they take advantage of the West Kent system by laying a connecting sewer from Kingston to Beckenham via Croydon to carry the Lower Thames Valley sewage. He stressed they could achieve this without an Act of Parliament or even a Local Government Board Inquiry since laying sewers under public highways needed no sanction. Although this option had always previously been rejected on the grounds of cost, it now held out the attraction that cost was the *only* obstacle to successful implementation and that neither government nor the public were a threat.

Bazelgette's proposal was given a blaze of publicity in the *Surrey Comet* of 8<sup>th</sup> November 1884 which reprinted in full the report he had sent to all the LTVMSB Board members along with a ringing endorsement by both Nelson and the paper's leader writer.

The Local Government Board had planned to hold a Public Inquiry into the proposal that the LTVMSB be dissolved and now added Bazalgette's scheme to the agenda together with a

requirement that the engineers of two alternative schemes that had been put forward should also attend. The LGB sent Mr J Thornhill Harrison, their most experienced Inspector, to conduct what was certain to be a difficult and ill-tempered confrontation. After a preliminary one-day hearing, the Inquiry proper started on 3<sup>rd</sup> December 1884 and was concluded on 9<sup>th</sup> January 1885 after a hearing lasting a total of 19 days. The LTVMSB were represented by Norman Bazalgette (Sir Joseph's son) whilst the spokesmen for the two prime movers of dissolution - Kingston and Richmond - were Frederick Gould and Charles Burt. At the outset the Inspector warned that

*for me to give any weight to your opposition you must show not only what you are going to do with the sewage of your own district, but also how the sewage of all the contributory places is to be dealt with: if you are separated, how the others are to be left in the lurch or what they are to do.*

With such a challenging requirement placed upon them, it was almost certain that the Inspector's report, delivered to the LTVMSB on 26<sup>th</sup> March 1885, would please few parties and so it proved. Apart from allowing Heston and Isleworth to detach themselves (mainly on the grounds that they were anyway not part of the original Joint Board) the LGB observed that ...

*there is the greatest difference of opinion on the part of the constituent authorities on the question of the dissolution of the district ... The Board are satisfied that difficulties similar to those which led to the constitution of the main Sewerage district would be found to exist*

... and made it clear there would be no scope for the separation of any other constituent district.

The LGB report went on ...

*there can be no question that if a scheme for the diversion of the sewage at a moderate cost could be devised there will be extreme difficulty in carrying it out except by a joint board such as that of the present district*

... but then made clear that the current Bazalgette proposal was *not* that scheme mainly on the grounds of expense and ended by encouraging them to ...

*fully consider whether it might not be practicable to adopt*

*some other scheme, which would provide for the disposal of the sewage outside the district of the Joint Board and which would entail less cost.*

As the leader writer in the *Surrey Comet* observed on the outcome ...

*It is sad to reflect that nothing definite is even now arrived at and the district is still not one step advanced towards the object for the carrying out which the Joint Board was formed.*

Even with hopes of support from the LGB for their separation bid now dashed, Kingston nevertheless felt it was prudent to temporarily postpone the second reading of their Dissolution Bill until after the Easter Recess. They then simplified the Bill to the point where it simply called for the straight dissolution without any conditional clauses. In this form it was passed by the House of Commons who, at the same time, also voted against the LGB-sponsored bill for the Mortlake scheme. In the face of this setback, the LTVMSB convened a special meeting on 17 June 1885 and voted by a majority of 15 votes to 8 to accept the verdict of the House of Commons and prepare to dissolve itself. The leader in the *Surrey Comet* cautioned

*should the Bill become law, all sanitary authorities in the Lower Thames Valley will find their hands full of the most costly and serious work. They will have, nevertheless, to look the matter in the face and if they are wise, will lose no time in endeavouring to solve the difficulty for themselves, which the combined wisdom of the Joint Board has found it impossible to do in the face of an opposition which has often been selfish, sometimes factious and always harassing and obstructive.*

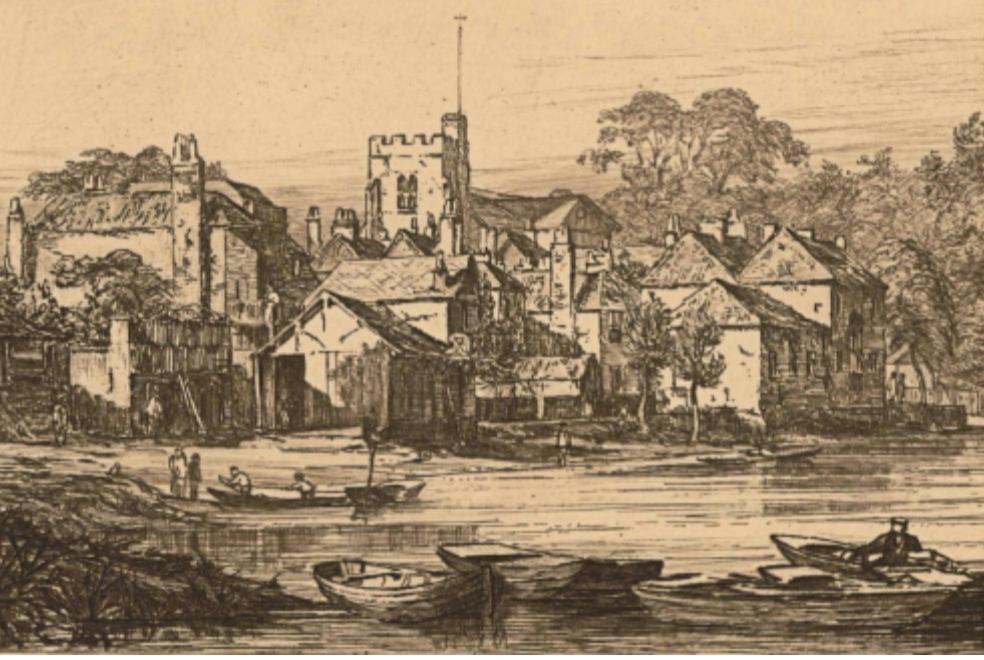
The Bill was passed by the House of Commons on 20<sup>th</sup> August 1885.

## **Sewerage Schemes of the Lower Thames Valley**

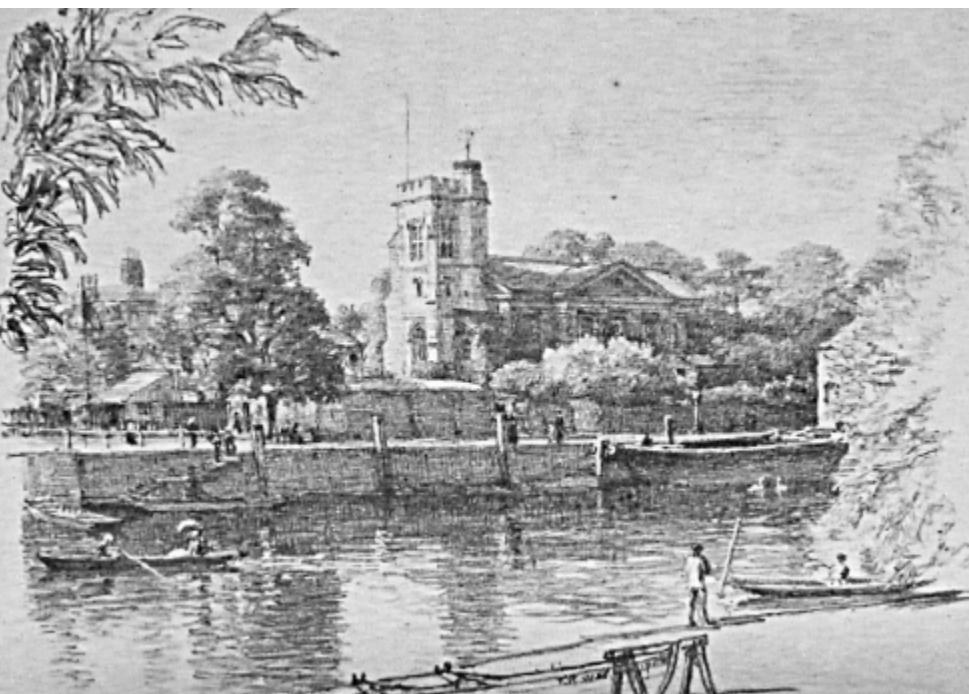
**1879 - 1899**

The demise of the Joint Board ushered in a new phase in the Drainage History of the Lower Thames Valley. The local authorities were now free (or required, depending on their perspective) to implement their own scheme. Some, including Kingston and Richmond, had anticipated the situation and had been planning for this eventuality for some time. Others, including East Molesey, Ham, Teddington and the members of both the Kingston and Richmond Rural Sanitary Authorities were confident their current cess-pit infrastructure would buy them sufficient time to consider their options. Arguably the worst hit were Surbiton and Hampton Wick whose active sewer networks discharging raw sewage into the river made them liable to swinging fines if they did not "abate the nuisance" within the two years allowed by the Dissolution Bill.

This section of the book will recount, in chronological order, how each authority eventually solved their drainage challenge.



Two views of the Twickenham river bank opposite Eel Pie Island.  
(above) 1870s view showing the picturesque but noisome foreshore  
(below) By 1900 a combination of the embankment - containing (and concealing) the new sewers - and the Richmond half-lock have transformed the view and rehabilitated this important part of the town.



## Twickenham - January 1880

### Introduction

The ancient parish of Twickenham consists of 2,415 acres, forming a broad wedge stretching westward from the Thames to Hounslow Heath. In the west the ground rises to over 50 feet, but elsewhere it is lower and on the whole very flat. Except for a thin strip of alluvium along the river and two patches of brick-earth, the soil is all gravel lying over London clay which is typically found 15-18 feet below the surface. The river makes a double curve past Twickenham, with several islands in its length, the largest of which is Eel Pie Island. The oldest houses and streets - as well as the Parish Church - lay opposite the island on the north bank of the river. By the mid-1860's the population of Twickenham was over 8,000 with the more recent housing having been built around the railway station (opened in 1848) and on the Common towards the west of the parish.

### The Formation of a Local Board

Twickenham was one of the last parishes to debate the formation of a Local Board. This event was precipitated by the passing of the *Thames Conservancy Act (1867)*, which prohibited the discharge of sewage into the River Thames by any town lying within three miles of its banks. The prohibition was due to come into force in January 1869 and from that date the penalty for not complying with it was up to £100 on conviction and £50 a day thereafter until the nuisance was abated. With this prospect ahead it was not difficult to find twenty ratepayers who were ready to sign a requisition for a meeting to consider the adoption of the *Local Government Act 1858*, which would enable the parish to establish a Local Board and borrow the money required to finance a sewerage and drainage scheme.

The first meeting of the Twickenham Local Board was held on 19 February 1868 and at the fourth meeting on 19 March 1868 a seal designed by the Chairman was adopted.

At their meeting on 14th May 1868 the Board appointed as their Surveyor Henry Malcolm Ramsay, a 40-year old former house-builder and immediately asked him to produce a drainage plan for the town. This was ready by September 1868 but, since the Thames Conservancy had deferred their deadline for banning

the flow of sewage into the river until 29 September 1869 the Board also deferred their consideration of Ramsay's drainage plan on several occasions.

It was not until 1873 that The Board applied to the Local Government Board for a loan of £25,000. A Public Inquiry was organised to be held on 29th December 1873 to be run by Major Hector Tulloch a recently retired Royal Engineer. Tulloch ran the Inquiry in a business-like but not over-bearing manner and the newspaper reports recount several moments of laughter and light-hearted banter during the day-long proceedings. He visited the proposed 25-acre filtration site on Whitton Common as well as land on the Mereway already purchased by the Board and gave his immediate reaction that both were too close to the village. He confirmed this opinion in his report delivered in March 1874:

*The pumping station is too close to the town. I do not think that the health of the inhabitants would be in any way affected by its proposed position, but the value of the houses near it would be depreciated.*

The Board successfully appealed the ruling on the Mereway site for the pumping station and received permission to apply for a loan of £20,000 to cover the sewerage and pumping station only. It was agreed the decision on the method and location of sewage disposal would be deferred.

By July 1874 final detailed plans and specifications were readied for inspection and tendering. The Board decided that the first contract should include all main and branch sewers along with house branches; it also included the tank works but the pumping house itself would be reserved for a later contract. They also decided that the embankment should be built by Board-employed workers under the direction of the Surveyor. It was designed to the same specification used on the recently-completed Thames Embankments in Central London - using Portland Cement and Staffordshire Blue bricks.

The first phase of construction covered the Richmond Road section of sewerage at the east of the parish along with creating the giant underground holding tanks at the Mereway outfall works. The Surveyor reported steady progress throughout the winter and spring period. Inevitably some problems were encountered which required extra unplanned work to be undertaken. In the course of creating a 60ft tunnel in the clay

directly underneath the railway line, the construction gang had found the works suddenly flooded. They discovered that the level of the top of the clay bed abruptly and unexpectedly dipped below the arch level of the sewer and it was impossible to proceed without creating a brick- or concrete-lined tunnel underneath the railway track within which to build the sewer. This new work was completed by August but added nearly £4,000 (nearly £6m) to the overall costs.

Meanwhile the Thames Conservators had agreed in principle to sell a portion of the foreshore facing Eel Pie Island to enable construction of the embankment.

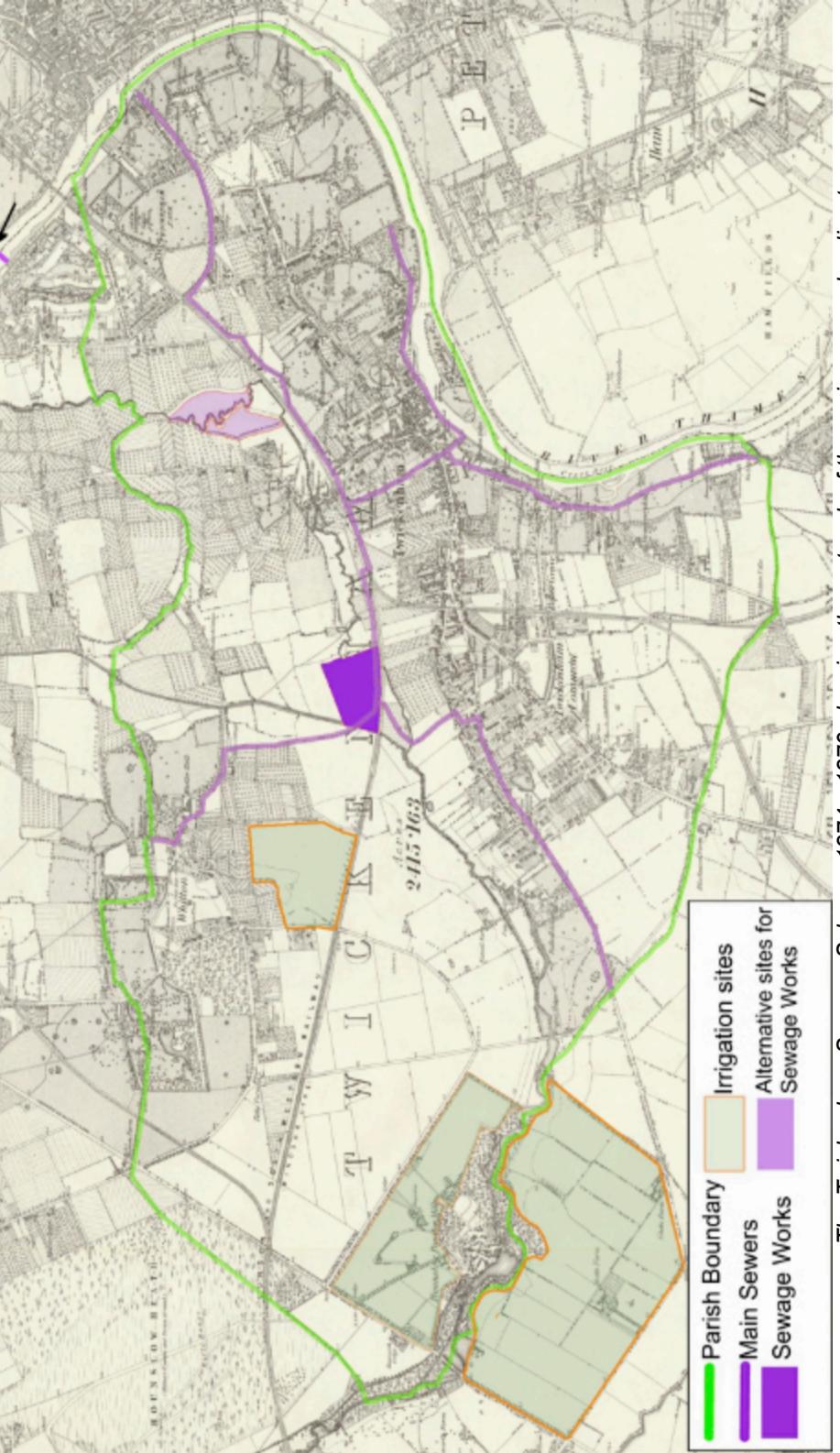
However the question of sewage disposal was still unresolved. The Board had still not found an owner ready and willing to sell his land to them and they recognised that their preference for the irrigation method would result in very significant legal - as well as acquisition - costs to implement it. They were drawn back to considering whether they could make do with just the Mereway site and were investigating a chemical precipitation and filtration scheme that was in use at Worthing.

The Board voted to apply for a further loan of £15,000 and a Public Inquiry to be run by Major Tulloch was set for 1<sup>st</sup> December 1875. However, when Tulloch learnt at the Inquiry that they were considering a filtration scheme in place of irrigation, he warned that he could not recommend the Local Government Board to grant the new loan and advised them to halt operations until the Local Government Board's response had been received. It arrived in time for the Board meeting of 10th February 1876 and was read by the Clerk:

*I'm directed by the Local Government Board to state that they have had under their consideration the report of their Inspector Major Tulloch made after his enquiry at Twickenham with reference to the application for sanction to borrow £15,000 for works of sewerage.*

*The Board learn from Major Tulloch that since they sanctioned the borrowing of £20,000 the Local Board have abandoned their original scheme by which the sewage would have been utilised on land and that the system which they now proposed to adopt is one of artificial filtration, the effluent being discharged into the River Thames.*

*The Board however do not find that they have been furnished*



*with detailed plans and a full description of the process of filtration and under the circumstances they will reserve their consideration of the present application until the particulars are supplied.*

The Local Government Board went on to demand a complete reconciliation of how the previous £20,000 had been spent including an explanation of what elements of the original scheme had not been completed and why the costs to date were in excess of estimates.

## The New Disposal System

The Board now asked their Surveyor, Malcolm Ramsay, to devise a scheme for sewage disposal that could be completely accommodated within the Mereway site. His response - which involved a process of screening, settlement, precipitation, filtering and finally aeration stages before the effluent was discharged into the Thames - was unanimously accepted. His detailed plans were submitted to the Local Government Board, who now relented on their previous decision and approved a further loan of £13,000. Twickenham were now in a position to complete the remainder of their original Contract. However a new storm cloud was about to loom over their horizon.

In November 1875, the Surbiton Improvement Commissioners had approached the Local Government Board with a proposal for the formation of a joint sewage board comprising more than 25 authorities on both sides of the river from Windsor to Brentford and Barnes to devise a combined solution to The Drainage Question. Although the LGB Inspector turned down the proposal as being "too heroic" but suggested a more modest scheme involving the 16 authorities located below the intakes of the central London Water Companies. The Hampton Wick Local Board made a fresh approach based exactly these 16 authorities - which included Twickenham. Thus alerted, the Local Board and many of the prominent Twickenham landowners swung into top gear and through their lobbying efforts succeeded in having Twickenham removed from the legislation. No one involved could have foreseen that this last-minute escape meant that Twickenham - by not being involved in the ill-fated joint board - thereby got its scheme completed at least seven years sooner than would otherwise have been the case.

## The Final Stages

The new drainage system began where the old one ended: on the foreshore opposite Eel Pie Island. The old drains which had rendered the area so unpleasant (especially at low tide on a hot summer day) were now enclosed in a handsome new embankment which contained an intercepting sewer. The Embankment remains today as the most visible evidence of the town's 1870s-built sanitary system. The whole installation was modelled on the Thames Embankments created by Joseph Bazalgette in Central London. However, his intercepting sewers were then able to follow the line of the river as it gently descended to the sea. The Twickenham sewers on the other hand had to pass in a direction contrary to the fall and contour levels of the parish on their way to the outfall works situated at a higher level than the embankment. To obtain a sufficient gradient to allow gravitational flow along their whole length, the sewers were sunk deeper and deeper below the surface, finally arriving at their destination at a depth of 35 feet.

The combined output from the five main sewers were received into huge tanks sunk 43 feet below the surface and capable of holding the parish's night flow. The engines and pumping machinery lifted the sewage 63 feet into a mixing well where milk of lime was added to cause the solid matter to precipitate in another set of underground tanks. The supernatant liquid was then drawn off into filtration chambers before being aerated over specially prepared surfaces. Finally the purified effluent discharged into the river.

## Official Opening

From the Middlesex Chronicle 3<sup>rd</sup> January 1880:

*The members of the Local Board paid an official visit to the new sewage works on Boxing Day when the whole system was seen in operation and explained by the surveyor Mr Ramsay. So far as could be seen the scheme appears to be finally successful and the visitors seemed perfectly satisfied with all they saw. The inhabitants, although they have had to pay something like £60,000 for their system of drainage, may be congratulated on having conquered what is admitted to being one of the greatest difficulties of the age; neighbouring parishes having already expended thousands of pounds with no result whatever. A quiet little dinner was given at The Albany in the afternoon when about 20 sat down to an excellent spread. The customary list of toasts was gone through and the chairman was warmly congratulated on the success which had attended the years of painstaking attention he has devoted to procure an efficient system of drainage for the Parish of Twickenham. A very agreeable evening was passed and the company broke up at an early hour.*

## New Malden - August 1888

New Malden began to develop as a separate township from Kingston in the second half of the 19th century, boosted by the opening of a railway station on the main line to Nine Elms (and from 1848 to Waterloo) on 1 December 1846. Until this time the area had fewer than a thousand inhabitants and consisted mostly of farms and smallholdings separated from Kingston by Norbiton Common. Kingston itself did not get a direct rail link until the opening of the Kingston loop line almost a quarter of a century later in 1869. By 1875 the population of New Malden had grown to 2,000. Governed by a Local Board, New Malden with its rateable value of £17,350 had a single representative on the LTVMSB Joint Board.

Even before the demise of the Joint Board in 1885, New Malden was starting to consider its post-Board sewerage options. By 9<sup>th</sup> March 1886 Thomas Heward, the Board's Surveyor, had prepared a scheme for their consideration. The land area of New Malden was similar to that of each of its neighbours Surbiton and Kingston Borough but, with less than a quarter of their rateable value, building a complete sewer system and treatment works was going to be a financial challenge. An added difficulty was explained in a leader in that week's *Surrey Comet*:

*In the parish of Kingston there are ... the Corporation, the Surbiton Commissioners, the New Malden Local Board, and the Rural Sanitary Authority of the Union, each having their own officials, their bye-laws, their duties and responsibilities. Each is, perhaps, apt to be a little too sensitive of any signs of interference from the other. ... Of late years Kingston has shown signs of desiring to draw other authorities into closer union with itself in matters which involved costs and charges, as for instance in their Bill for the dissolution of the Joint Board.*

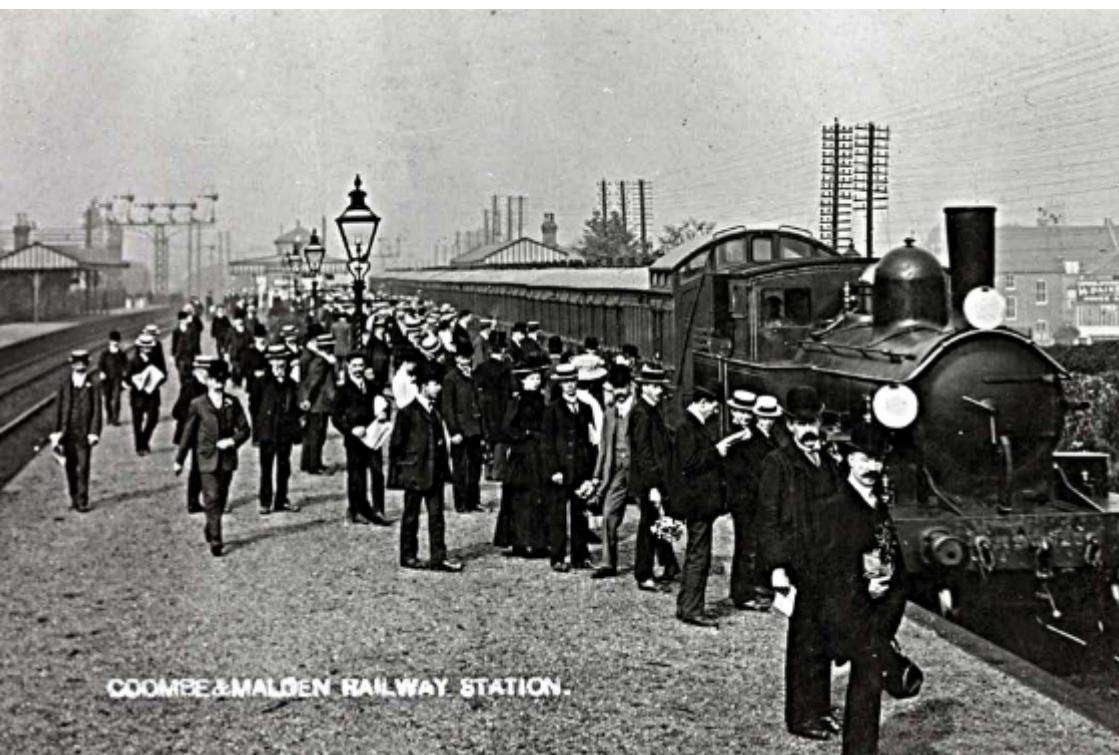
The objectivity of this accusation was perhaps questionable since the Editor of the *Surrey Comet* was FS Merryweather who was also a member of the New Malden Local Board and chairman of its Drainage Committee. Nevertheless its justification seems entirely vindicated by the subsequent action of the Kingston Council who, having had the New Malden scheme presented to them, decided to invest 25 guineas of their ratepayer's money in commissioning James Mansergh CE, the

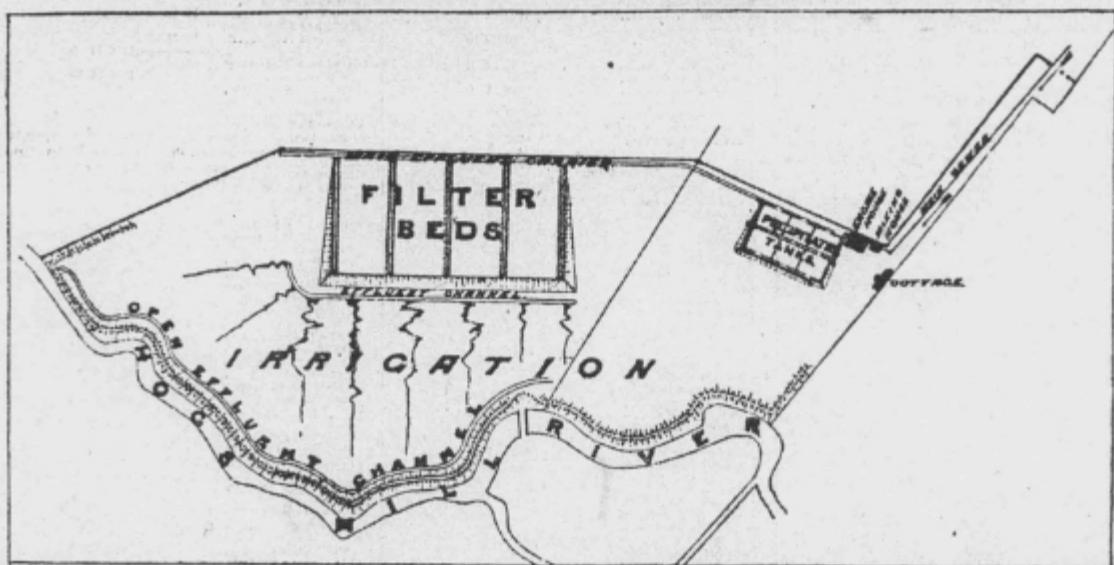
eminent drainage engineer to suggest some "improvements" to New Malden's scheme. Mansergh's report was received soon after and Kingston Corporation's sewerage committee

*caused a copy of the report to be presented to the New Malden Local Board and have suggested they postpone the public inquiry upon their scheme and the committee hope that this will be acceded to so that it may be unnecessary (for Kingston) ultimately to appear in opposition to the scheme. The Corporation would not forget the way in which the Local Board (of New Malden) seemed desirous to carry out their scheme in defiance of their neighbours.*

New Malden declined Kingston's invitation to change their scheme and the LGB Inquiry went ahead with a heavy and hostile representation from Kingston Corporation pressing for its rejection. This opposition caused the LGB to examine the application at such great depth that their decision was a long time arriving but finally at the end of July 1887, they gave the scheme their unqualified sanction without the need for any further Inquiry.

*Below: New Malden station (seen here around 1905) first opened in December 1846*





## The New Malden Sewerage Works

From the *Surrey Comet* 16<sup>th</sup> June 1888

For many months before the dissolution of the Lower Thames Valley Main Sewerage Board, the Local Board of New Malden was seriously considering what was to be done in the event of the complete failure of that body. The New Malden district was perhaps – except in its own opinion – one of the smallest and least important of the many which formed that never-to-be-forgotten Board, and some members, especially of the New Malden Local Board, gave careful and anxious thought to the needs of the district in view of the final collapse of the central authority, which was slowly but surely approaching, and which eventually took place, by an Act of Parliament passed in 1885.

The Authority of the New Malden no sooner found itself relieved from its allegiance to the central Board than it determined to have a scheme of its own; and at a meeting of the Board, October 6, 1885 on the proposition of Mr FS Merryweather, of New Malden, a committee of three members including the Chairman (Mr Edwin Farley), Mr B Looker and himself were appointed to primally consider the best means of obtaining not only a thoroughly efficient drainage system, but a site whereon to erect works, on which the effluent could be effectually treated, and an unquestionable result obtained. The committee, after long and careful consideration, made their report at a special meeting of the board on 22nd December 1885 in which they advised, in dealing with the sewage of New Malden, the adoption of the most approved mode of chemical precipitation with downward and intermittent filtration through land so as to embrace the recommendations contained in the final report of the Royal Commission on Metropolitan Sewage, and the special report of the Select Committee of the House of Commons on the Mortlake scheme, proposed in 1884 by the Lower Thames Valley Board. The report was unanimously adopted and Mr T L Hewett, of 7 John-street, Bedford-row, London, was at once instructed to prepare detailed plans and estimates which were submitted to a special meeting on 9th March 1886. Although a competitive scheme was submitted to the board

by Mr JW Gibbon and considerable time was spent in examining into the relative merits of the two schemes, that of Mr Heward was finally adopted, and tenders were soon after obtained for the necessary works. The tender of Messrs Cook and Co of Phoenix Wharf, Battersea, for £12,800 exclusive of machinery was provisionally accepted.

The site of the works as shown in the above sketch is on the north side of the Hog's Mill river; it was very carefully examined by Mr Heward and strongly recommended as in every way most suitable to the efficient working of the proposed scheme. It was provisionally purchased of H.R.H. the Duke of Cambridge, at a cost of less than £1,200, and embraces about 11 acres. Having made this arrangement the Local Board in December 1886 applied to the Local Government Board for the necessary sanction to borrow £15,800. In reply to this application an enquiry was held on 10th of March 1887 by Mr T Codrington one of the Local Government Board inspectors, when the Corporation of Kingston appeared in strong opposition; the opposition, however, entirely failed. Some alterations in the scheme having by the advice of Mr Baldwin Latham, the eminent engineer, been made to meet the wishes of the inspector as to the deepening of the main sewer, the consent of the Local Government Board was given on 20 July 1887. The Local Board lost no time in authorising the commencement of works and the contractors began the new sewers on 21st of August. Mr G.B. Jerram A.M.I.C.E. of Walthamstow was appointed consultant engineer, and Mr Henry Richards C.E., clerk of the works.

Although the weather during the winter months was exceptionally bad for works of this kind, they were proceeded with with satisfactory rapidity. The scheme includes the sewerage, not only of the public roads throughout the district, but all private roads that have been made, and there is a connecting junction to every house and building allotment. The deep portions of this sewer were carefully tunnelled, all the pipes are bedded in concrete, closely jointed in cement, and laid at a self-cleansing gradient. As in some parts the depth of the main sewer is over 20 feet the Board, at the suggestion of Mr Heward, have laid a sewer for house connections upon the line of this main, so that all houses they have equal facility in its use.

It is estimated that the sewage delivered at the farthest limit of the system will reach the works within an hour. It will there be chemically treated. The machinery, which is contained in the neatly designed buildings, shown in the above sketch, is powerful and efficient; the pumps and the gas engines by which they are worked are in duplicate, and are supplied by Messrs Andrew and Co. of Stockport. The chemical mixing machine is the patent of Messrs Bose Scott and Read. The sewage pumped from the sump which is about 27 feet deep would be mixed with the chemicals before it enters the tanks. These tanks are substantially built and admirably arranged so as to work in sets of three, or even singly if desired. The sewage will flow into the tanks by a simple contrivance which prevents any sudden rush or disturbance, and by its gentle flow from tank to tank precipitation will more rapidly proceed. The effluent will pass from the last tank by means of floating arms into the effluent carrier and, after travelling at a distance of about 150 yards, will be discharged on the filtration area, which as it will be seen, is divided into four large beds. In the formation of these beds, which may be regarded as the most important feature in the scheme, it was discovered that the character of the soil which was thought to be chiefly clay, was indeed light, gravelly and porous, and when dug most admirably adapted for the purpose; the whole of the filtration area has been excavated to a depth of about 5 feet, well drained over the bottom, and divided by clay banks. Each bed is a quarter of an acre in extent, and the cost of the forbearance has not exceeded £400. The effluent already purified by precipitation, having passed through this prepared filter, will flow out of the pipes in a clear and pure state into an open carrier and after irrigating nearly 5 acres of land finally runs at the extreme end of the site into the Hog's Mill river.

The sludge settling in the tanks will be drawn off through sluice valves into the sludge culvert under the central wall, discharging upon beds specially prepared, from which it can be carried away for sale.

At the end of the sewer on the works, the last manhole will be fitted with a floating bed to which will be fitted a small electric alarm which will be connected to the cottage about to be built which in case of storm or any sudden rush of

sewage will rise to a given point when the alarm will be raised and the man in charge will at once set the pumps to work. By this arrangement it is almost impossible that flooding of any kind can take place.

The land upon which the works are erected is enclosed on its north-western boundary by a substantial 9-inch brick wall extending to a length of 1500 feet.

The work will probably be completed in every detail by the beginning of July, and therefore it will be a race between New Malden and Kingston as to which Authority will have the credit of being the first of all constituents of the late Joint Board, to provide works in actual operation for the sewage of the district.

*Below: New Malden in 1898*



## **Kingston on Thames - November 1888**

## Background

In Spring 1865, contractors for Kingston Town Council were busy putting the finishing touches to the town's new sewer scheme which would add 4 miles of brick sewers and 5 miles of pipe drains to the existing system. The Corporation had previously written to the Thames Conservators asking to be allowed to extend the drainage outlet by 30 feet but, in doing so, had alerted the Conservators to their plans and were met with the response that that body would use

*every opposition in their power to stop this happening.*

Attempts at reconciliation having failed, the Thames Conservators took the Corporation to the Chancery Court seeking an injunction preventing them both from enlarging the existing outflow and bringing into use the new sewer system. They argued that

*the [additional] discharge would be injurious to the health of persons navigating ... the river ... or dwelling on ... the banks of the river ... and would destroy the fish in the river, and to this and other respects be a great and serious nuisance.*

By citing the law of "nuisance" (defined as causing a substantial and unreasonable interference with a [claimant]'s land or his use or enjoyment of that land) the Conservators needed only to prove the existence of a nuisance - no mitigating arguments about off-setting benefits ("for the greater good of the people of Kingston") are allowable under nuisance law - and they would obtain their injunction. In the event, in their judgement issued 13 June 1865, the Court ruled that they could only grant an injunction on the basis of the existence of *actual* rather than *potential* nuisance. The Kingston extended sewer system was in full operation by August 1865 ...

## The Ham Fields Scheme

Kingston surmised that their legal spat with the Thames Conservators would make them a prime target for future penalties and thus sought to find a swift alternative to their now-illegal sewer outflow. They proposed to take 176 acres of land, of which 146 acres would be used for sewage irrigation. The land was situated at Ham Fields which lay within the Kingston parish to the north of the main town. After a Public Meeting held in January 1869 had unanimously approved their proposed action, the Council (as reported by the *Surrey Comet*):

*affixed their seal to a petition ... to one of her Majesty's Principal Secretaries of State describing the land intended to be taken in the parishes of Kingston-on-Thames and Ham for drainage purposes; and praying to be allowed to put in force the powers contained in the Lands Clauses Consolidation Act 1845 for the purchase and taking of the said land 'otherwise than by agreement'.*

In March 1869 the Local Government Board sent down an Inspector to hold a five-day Public Inquiry in Kingston Town Hall to establish whether the estimated cost of land purchase (a figure revealed only to the Inspector) was a sound investment on the part of the Corporation of Kingston-upon-Thames. All seemed to have gone well for their case - especially when the Inspector declined to receive any evidence from opponents of the scheme - so Kingston Council were dumbfounded when they received the following curt letter on 25 March 1869:

*On most carefully considering the evidence, and all the contingencies connected with the scheme of proposed Sewage Irrigation at Ham by the Corporation of Kingston, I have concluded to recommend The Secretary of State for Home Affairs to withhold his sanction; but at the same time to advise the Conservators of the river Thames to extend the time of their notice. I have reason to believe my recommendations will be approved.*

The Council tried in vain to access a copy of the full report and only private correspondence between the Inspector and the Kingston Town Clerk cast some light on what was claimed as one of the underlying reasons for refusal:

*I consider that if a purchase of the land in question could be affected, the price will not be below some £500 per statute acre; and as the sale must have been 'forced', the costs and price would probably have exceeded this sum. This consideration alone to my mind was fatal to the proposed scheme.*

## The Apps Court Scheme

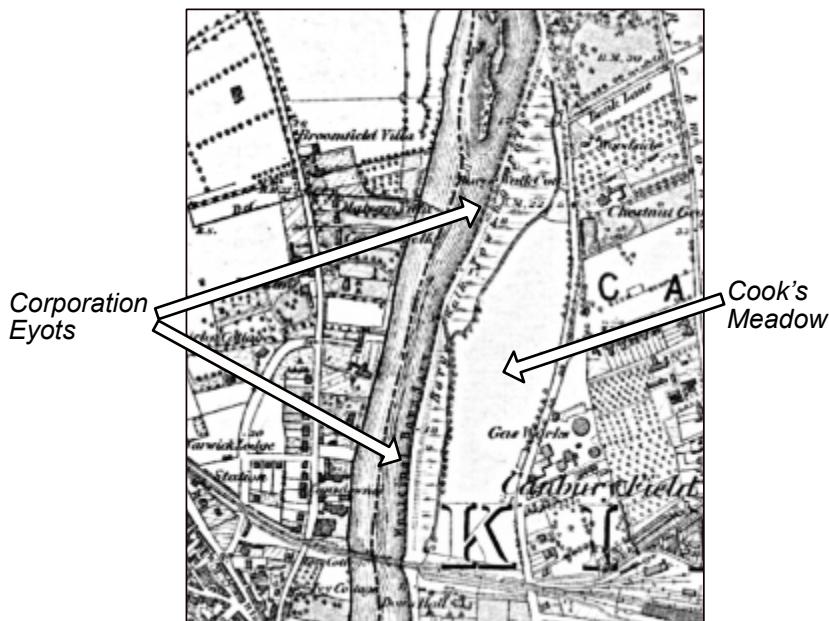
In early 1872 Kingston tried once again to formulate a scheme to deal with the Town's sewage. This time they were proposing to use Apps Farm, a 140 acre site a mile and a half downstream from Walton Bridge and they had already purchased the land before the LGB Inquiry was held on 30 April in Kingston Town Hall. There were a significant number of objectors from Walton and East Molesey whilst Kingston made a point of encouraging the water companies to send representatives in order to satisfy them that there was no danger of pollution to their intakes. Although the LGB Inspector was at pains to emphasise that his inquiry was strictly on the financial viability of the scheme not on its potentially noisome properties, the LGB nevertheless accepted the Inspector's recommendation and decided in July that the scheme should be rejected. The fact that Kingston now owned the land at Apps Farm would play a significant part in Kingston's future relationship with the LGB. The *Surrey Comet* leader writer proved once again how well versed the paper was in the science and politics of sewage schemes:

*It is, however, necessary that Kingston should do something more, and we can see no other course than to give up the idea of a sewage farm—which we never believed in for our purpose—and go in for a process like that in successful working at Merthyr Tydfil. We have our own land, and more available, at the outfall of the sewer, and there we should purify as far as the light of the present day will permit, discharging the effluent water into the proper channel for it—the river. This is, we believe, the only feasible and rational plan for Kingston, unless it is desired to ruin its inhabitants.*

The process to which the writer refers was the so-called ABC process (using Animal charcoal, Blood, Clay and Alum) which had been devised and patented by The Native Guano Company (NGC) in 1869. Based on chemical precipitation, the outputs of the process were an effluent pure enough to be discharged without further treatment together with a highly efficacious and odour-free solid fertiliser produced by baking the sludge. By the mid-1870s, the Native Guano Company were looking for a partner authority where, through a joint venture, they could showcase the efficacy of their process and encourage other authorities to take up their approach.

## The Corporation Eyots Scheme

Kingston already owned two adjacent sections of riverbank totalling 11 acres, known as the Corporation Eyots, and located immediately south of the sewer outfall. They were also negotiating on a further 17-acre field known as Cook's Meadow which lay between the Eyots and the Lower Down Hall Road.



At a Town Council meeting in August 1875 The Mayor, as chairman of the Special Drainage Committee, reported that the agreement with the Native Guano Company was ready for signature and merely awaited the resolution of the issue with the Charity Commissioners concerning the value to be put on the parish land that the Council were buying to provide the site for the works. Under the Agreement, the Native Guano Company provided the capital and the Council provided the land and paid the company "a small subsidy" - but only if the standard of the effluent water met the standard set by the Thames Conservators. If the Native Guano Company defaulted, they would forfeit the works to the Council.

The negotiations with the Charity Commissioners took longer to resolve than anticipated and by November 1875, the Native Guano Company had lost patience and withdrawn from further

negotiations. They confirmed the delay was the cause and added

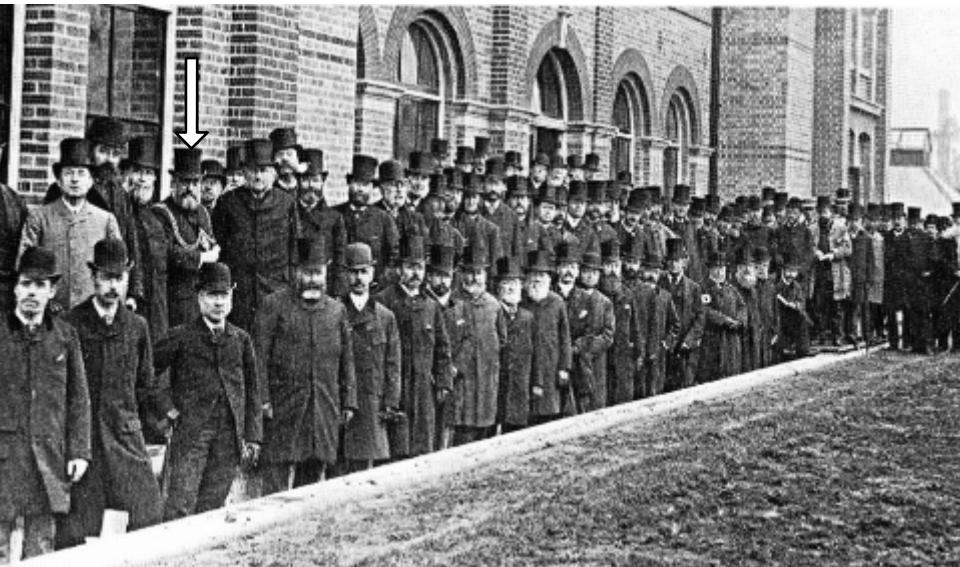
*They did not propose to deal with the sewage ... from any philanthropic motive towards Kingston but to exemplify the process so that others might see it.*

By January 1876 it was clear to all authorities in the Lower Thames Valley that joint action was the most likely way forward. Although the Surbiton Improvement Commissioners grand plan for a united district of 30 authorities was adjudged to be "too heroic" by the LGB Inspector following a Public Inquiry, the Inspector instead suggested a more modest alliance of the authorities between Hampton and Richmond should be encouraged. Kingston were reluctantly drawn into the Joint Sewerage Board, but arguably never gave it their whole-hearted support during its eight years of existence and ultimately were directly responsible for its demise.

In June 1885 and in return for removing their opposition to the Kingston Parliamentary Bill aimed at dissolving the LTVMSB, Kingston had offered both Surbiton and Hampton Wick access to their revived plan for a sewage treatment works on the Corporation Eyots on very favourable terms. As a result of their acceptance, the scheme now had to cater for a 250% increase in the total population whose sewage was to be treated compared with the 1875 scheme. The agreement with the Native Guano Company was revived and the Kingston Town Council Drainage Committee proceeded with their detailed planning but drew a cloak of secrecy over their discussions. This caused great resentment not only with the public and local press but also with fellow councillors who were not kept abreast of developments. The Drainage Committee finally revealed their plans in April 1886 which now included having access to almost 30 acres of land since the Council had now added the 17-acre Cook's Meadow to the original Corporation Eyots site. Kingston had also agreed to re-site the treatment works on the meadow itself and to turn the building sideways so it was further away and less obtrusive to the residential properties on the Hampton Wick side of the river.

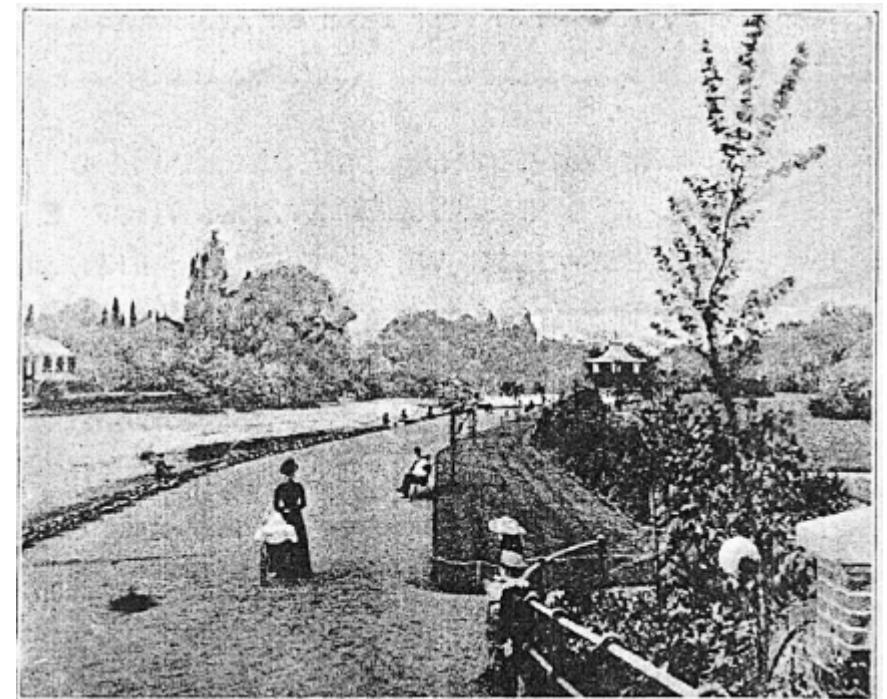
It took a further year to complete the detailed planning and receive tenders for the work but a single contract for all elements of the work - including both the Kingston and Surbiton sewer network - was placed with 37-year old William Cunliffe in May 1887. The contract was unusual in that it

required Cunliffe to fund his own work (amounting to £25,000) in return for an annuity of £1,472 running for 25 years, an ingenious arrangement showing just how unwilling Kingston were to face another LGB Public Inquiry. Progress on the works was being made so rapidly that the *Surrey Comet* carried a detailed description of the works in their 18 February 1888 edition. Around 100 people attended the opening ceremony and luncheon presided over by The Mayor, Alderman Walter East (arrowed below) on 6<sup>th</sup> November 1888.



The rest of the site was converted into a public park and named Canbury Gardens (opposite). The Council was reluctantly persuaded to spend extra money raising the level of the Lower Eyot to match that of the rest of the ground and the resulting facility was opened on 8 November 1890 and immediately proved immensely popular with the people of North Kingston. The provision of tennis courts, a bowling green and a bandstand added to the attraction and it seems that, with one exception, the coexistence of a public park and a sewage treatment works posed few problems. However that exception was enough to eventually require the termination of the agreement between the Council and the Native Guano Company.

The final stage of the process to convert sewage into saleable fertiliser required that the sludge be baked into a hard cake in



an oven before being ground into a powder. According to the local press the fertiliser helped to grow harvests in Singapore and sugar in Barbados. However contemporary reports also complain of a noisome stench at the moment when the ovens were opened.

The agreement with the Native Guano Company had been negotiated on a rolling 10-year term. Relations between the two sides were sometimes difficult probably caused as much by their dissimilarities - a commercial company partnering with an often fractious local authority - as their common interest in the operational success of the venture. When it came time for the second renewal in 1909, the two sides agreed to end their relationship with Kingston Corporation now taking over the whole operation. However it seems the commercial value of the fertiliser was still sufficient to persuade the Native Guano Company to conclude an agreement to purchase the sludge from Kingston and ship it by barge to Southall where they established a new final treatment works for the baking, grinding and bagging operations.

## Surbiton - November 1888

Until 1855 Surbiton was administered as part of the parish of Kingston upon Thames. In that year a body of Improvement Commissioners was formed by a local act of parliament to provide autonomous local government for the area. In the 1830s when the London and Southampton Railway were proposing that their route from Southampton to Nine Elms (now Vauxhall) should pass through Kingston, the Town Council rejected the approach fearing it would adversely impact their stagecoach trade. The railway company were forced to reroute their line by creating a deep cutting through Surbiton Hill with a station to serve the would-be commuters. The population of Surbiton increased from 500 to 7,500 within very few years whilst Kingston had to wait another 30 years before it too got a rail link via New Malden.

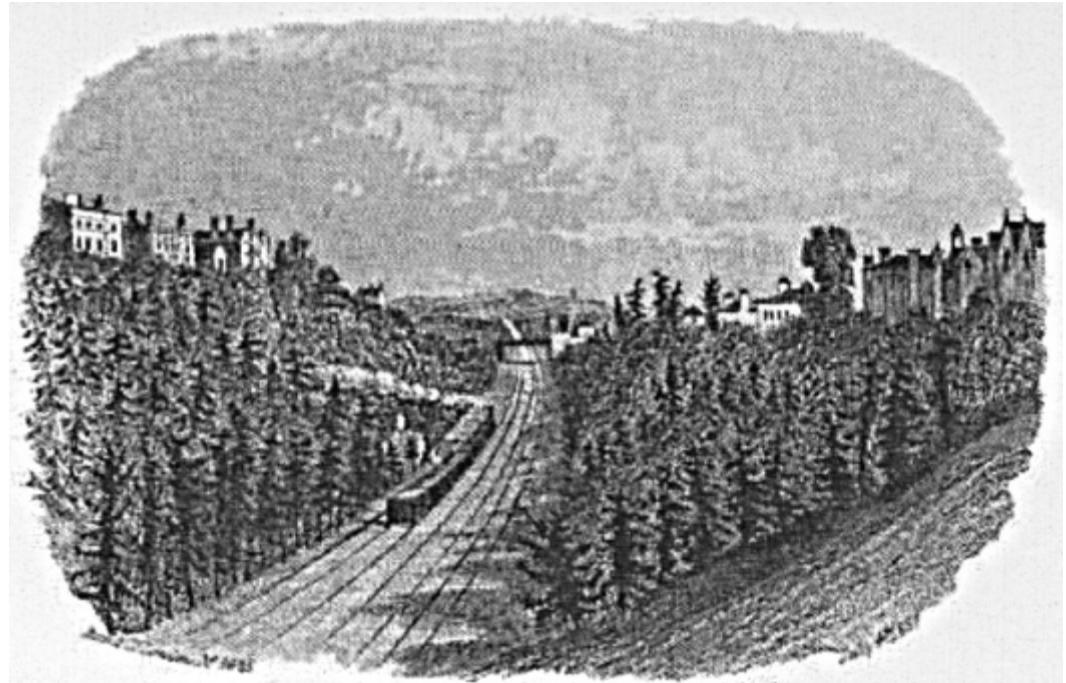
The Improvement Commissioners lost no time in appointing a Surveyor and instructing him to make a general report as soon as possible of the best method of draining the district, and...

*suggesting a general scheme of drainage for the district south of the railway, and pointing out all the portions of the plan he may recommend to be immediately proceeded with, with a view to remedying, if practicable, the more pressing nuisances.*

The line of the railway aggravated the issue in that the land and property to the north of it was owned by Messrs Coutts and Co and, being deemed to be already sufficiently drained, was exempted from the sewer rate. In November 1857 the Surveyor's scheme was put to a public meeting of the ratepayers and owners of property south of the railway but a unanimous resolution was passed that

*though thanking the Commissioners and the surveyor for the care and pains which have been bestowed on the subject ... the meeting is of opinion that the scheme of drainage submitted by the Commissioners requires further consideration, and requests the Commissioners to call in further aid in investigating and reporting on what is requisite for the sufficient drainage of the district generally, expressing the hope that no more money will be expended on such drainage than is actually necessary.*

As a result of this meeting a special sub-committee was formed.



They initially proposed dividing the district into three for sewer rating to reflect the differential costs of draining each element but they eventually agreed a uniform rate for all properties south of the railway. The sewer system was to start in Berrylands on the east of the district and end in an outfall at Seething Wells. The scheme, after voluntary contributions from landowners totalling £1,735, was to cost the rate-payers of south Surbiton a total of £2,500.

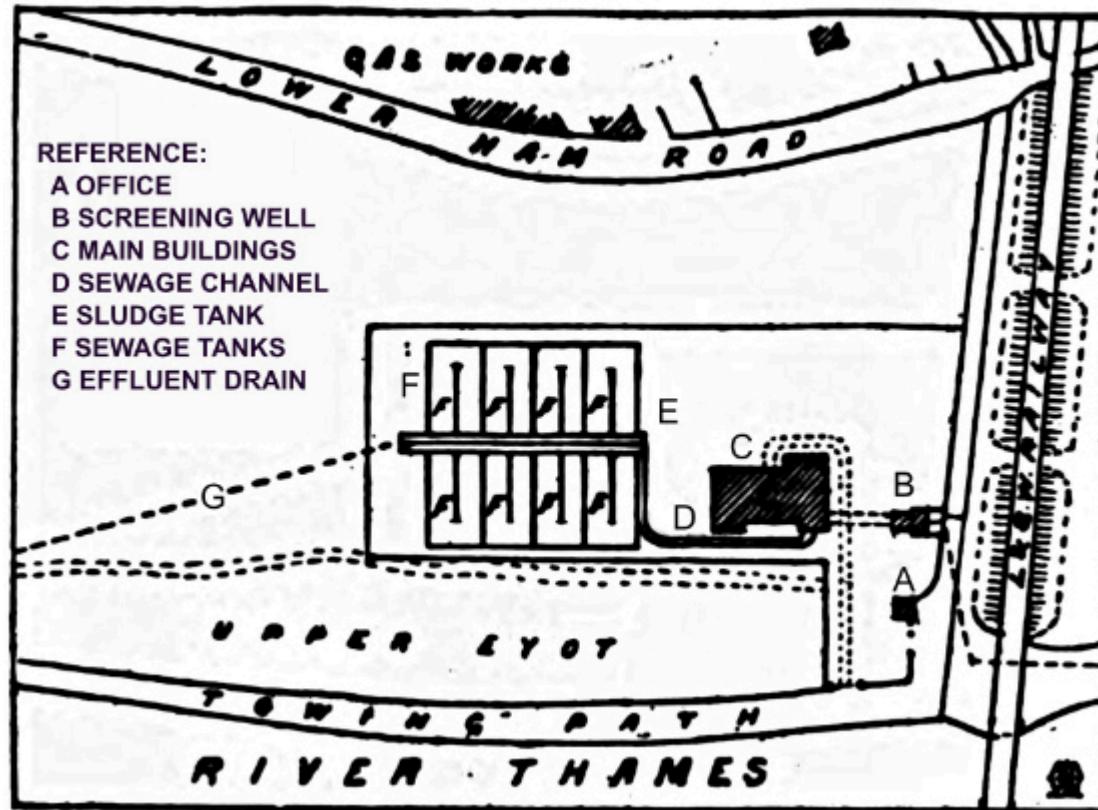
The scheme was completed at the end of 1862 but was soon to be rendered illegal by the passing of *Thames Navigation Act 1866*. Surbiton joined the ranks of those authorities with an active sewer system discharging into the Thames and liable to swingeing fines if they failed to abate the flow.

Following the passing of the *Public Health Act* in 1875 the Surbiton Improvement Commissioners under their Chairman Charles Walpole played leading role in the attempted creation of a combined Sewerage District in 1874 (see page 15). After this initiative failed, they actively explored the possibility of joining Kingston in their Corporation Eyots scheme but, when Kingston's commercial partners withdrew from the venture, Surbiton became - and remained - willing and constructive members of the Lower Thames Valley Joint Sewerage Board. They strongly opposed the attempts by Kingston (and later Richmond) to have that body dissolved by parliament but when it became clear these attempts were likely to succeed, Surbiton (like Hampton Wick) withdrew their opposition when offered the opportunity to join the revitalised Corporation Eyots scheme on very beneficial terms.



## Description of the Kingston and Surbiton Sewage Disposal Works

From the *Surrey Comet* 18<sup>th</sup> February 1888



The sketch and plan given above show the principal elevation of the chief building, and the block plan of the sewage works, now in course of construction for the Corporation of Kingston upon Down-hall meadow. The works, it is well known, are being constructed by the Corporation of Kingston for the reception and treatment by the ABC or Native Guano Company's process, of the sewage of Kingston and Surbiton - Surbiton being admitted under deed of arrangement made on 27th January of last year. The works are now considerably advanced, sufficiently indeed to enable

a comprehensive idea of them to be formed, and to permit of a detailed description of them being written. The works were commenced in August of last year and are from plans designed by Major McCauley the borough surveyor, with the assistance - in such matters as related to the special requirements of the Native Guano Company - of Mr Robinson the company's engineer. The contractor to whom the execution of the works was entrusted is Mr Cunliffe of Dorking who together with Mr Stevenson the clerk of the works, is entitled to praise for the very substantial and workmanlike manner which all has so far been carried out.

The works - the entrance to which is from the barge-walk, just below the railway bridge - comprise a series of tanks, engine and store house, and office. The office, which is the smaller of the two buildings, and situate nearest railway, will be used for administrative purposes. The larger building - the engine and store house - contains on the ground floor, at the end facing the railway, engine rooms with sewage tanks under, boiler-house, and coal store; the middle of the building will be used for the preparation of the chemicals to be used in precipitation, and for storage purposes; and at the further end is the machinery for dealing with the sludge, a portion of which, including the sludge presses etc is upon the floor above.

The sewage will flow into the works by means of sewers laid from the Lower Ham Road alongside the railway, at a point opposite the end of the engine and store-house, the sewage of the two places, Kingston and Surbiton, being brought in by separate channels. On arrival at the works, the sewage will pass through two screen chambers or grids, by means of which the coarse particles will be held back, and thence through conduits into the two wells situate as already mentioned under the engine rooms. The Surbiton sewage will fall into the well to the left, whence it will be pumped and measured by machinery, provided especially for the purpose by the Surbiton Improvement Commissioners, a height of 4 feet through the dividing wall into the adjoining well containing the Kingston sewage. While here, it will receive an admixture termed by the company the "B.C." admixture which completely deodorises the sewage, and deprives it

entirely of its offensive character so far as smell is concerned. From this well the sewage will be pumped a height of 10 feet into the open carrier, along which it will flow into the tanks. Gwyn's centrifugal pumps are to be used - two for lifting the sewage from the Surbiton well to be together capable of raising 1,300 gallons a minute 4 feet high; and three for lifting the sewage from the Kingston well to the carrier, to be each capable of raising 1,600 gallons a minute 10 feet high. The engines will be of the pattern constructed by Messrs Willans and Robinson, Ferry Works, Thames Ditton, three of 15 HP for pumping, and one of 45 HP for driving the mixing and sludge machinery. Two additional engines will be provided by Surbiton for their pumps. There will be three boilers of the locomotive type, two of 60 HP and one of 80 HP. The greater part of the space in the centre of the building on the ground floor will be devoted to the preparation of the chemicals to be used in the precipitation of sewage. Here will be a mortar-mill and vats for mixing the "B.C." mixture already mentioned, and for mixing up alum and other chemicals.

After the sewage has left the pumps, it will pass through a meter into an open channel along the front of the building, and as it passes the alum vat, it will receive its charge of alum solution. Upon the admission of the alum precipitation commences. The sewage will now flow through an open channel - rather rapidly, so as to get the chemicals well intermixed - to the tanks. These are eight in number, there being two sets of four, the delivery channel running between. This delivery channel has been purposely extended further than needed for present arrangements so that if necessity arise two additional tanks can be constructed - one on each side. Each tank is reckoned to be capable of dealing with the sewage of 5,000 people, so that in the eight tanks there is effectual provision for the sewage of 40,000 inhabitants, with the additional provision tank space for 10,000 more when required. The present population of Kingston is calculated at 23,000 and that Surbiton at 11,000 - total of 34,000. Each tank is provided with what is termed a scum-board, which rises and falls with the sewage and effectually keep back floating matters which would be unsightly. A central brick partition extends three-fourths the length of each tank the

object being to secure a gradual flow of the sewage round the tank so as to afford ample time for the settlement of the sludge. When the first tank becomes full the liquid will overflow into the next, and so on until it has passed (if necessary) through all the series of eight, which are to be fitted with shutters and valves so that they can be used in whatever order of succession or combination circumstances render most convenient. When thoroughly purified the effluent will pass through a trumpet-mouthed pipe, fitted to each tank, into the channel along which it will gravitate to the Thames, entering the river under the iron bridge spanning the barge walk. In order to empty any of the tanks for purposes of cleansing, each tank has another pipe near the bottom, to which is fitted a floating valve, which falls with the sewage, and by means of which the liquid is gradually drawn off from the top —thus preventing as far as possible the passage of solid substances.

As the bottoms of the tanks slope down to one end, the sludge accumulates in this direction and is now removed from the tanks for treatment. This removal is affected by means Tangye's sludge pumps, situated in the engine house, through which the sludge is drawn up and again discharged into the circular sludge tank. It is now subjected to 2 processes in order to deprive it of its moisture. It is first drawn into two large accumulators, like huge boilers, egg-shaped set up on the end in the following manner. By means of powerful air pumps the air is exhausted from the accumulators so that a vacuum is created, and a valve, which has a connecting pipe to the sludge pit, is open, and the sludge is sucked up into the accumulators until they are full. The valve is then closed and another is open and communication thus established with the sludge presses, the sludge being forced up into them by a strong pressure of air pumped to the top of the accumulators, supplied from a vessel in which a pressure of 160lbs is maintained by means of air pumps. 50% of the moisture contained in the sludge is removed by the presses, and the sludge then falls down to the room below, where it is dried in cylinders, a further 40% of moisture being removed from it. It is now broken up and pulverised by means of a disintegrator, bagged and labelled ready for sale as "Native Guano". During the pressing of the

sludge there is a certain amount of vapour given off, which if allowed to escape would be objectionable. This is carefully condensed in two chambers by means of coils of pipes placed in water tanks before being passed into the outer air.

A good deal of work still remains to be done, but the contractor hopes to have the works completed, including machinery, at the end of April. Some of the machinery is already to hand, and as fast as the slating of the roof is done, the machinery will be fixed. The workmen are at present engaged in roofing the engine and store house; four of the tanks are finished — lacking only a coating of cement, which they will receive as soon as danger from frost has passed — and the remaining four tanks are in an advanced stage of progress.

The amount of the contract, inclusive of the machinery is £23,000 or about 10s. per head of the population which the works are calculated to serve — stated to be one of the lowest, if not the lowest cost, at which sewage works have been constructed anywhere in United Kingdom where the sludge pressing system together with drying by heat is adopted. The sludge presses and other machinery ordered for these works are very expensive, and in view of this fact the cost is considered exceptionally low.

Any notice of these works would be incomplete without reference to the close attention which has been given to them from their inception and all through their progress by the Mayor Mr Walter East. He has devoted an immense amount of time and trouble to them, the whole of the details having been passed through his hands as chairman of the Drainage Committee. Whatever the outcome of the works may be, and we hope they may be in every way successful, the public will owe the mayor a great debt of gratitude for the labour he has undertaken on their behalf

## Kingston Rural Sanitary Authority



The same 1875 Public Health Act that had enabled the formation of the ill-fated Lower Thames Valley Main Sewerage Board also required local authorities to take responsibility for various public health matters such as providing clean drinking water, sewers, street cleaning, and clearing slum housing. For those areas without a town government (i.e. where the vestry system was still in operation) this responsibility was exercised by a Rural Sanitary Authority consisting of the existing poor law guardians for the rural parishes involved.

The Kingston Rural Sanitary Authority covered the parishes of Coombe, Malden, Tolworth, Hook, Long Ditton, Thames Ditton, Esher, West Molesey and Hampton. They met once or twice monthly in the Board-room of the Kingston Workhouse (later the Kingston Registrar's Office) opposite Norbiton Station. From 1877 until his death in 1891, the chairman was Gen. Sir Orfeur Cavanagh, a retired British East India Company

soldier and the last Governor of Straits Settlements to be appointed directly by that Company - his successors were appointed by the Colonial Office. Whilst the nine parishes were covered by their membership of the LTVMSB, their relative geographic location was of no particular consequence. However with the demise of the Joint Board it was necessary to group the parishes according to the watercourse into which the effluent from the various joint sewage works would flow. At an LGB Inquiry held at the Kingston Workhouse on 8 January 1887, Kingston RSA sought permission to create one group consisting of Esher, Thames Ditton and the western half of Long Ditton draining into the River Mole with a second group uniting Hook, the Tolworth division of the parish of Long Ditton and the Southborough portion of the parish of Kingston in a system draining into the Hogsmill stream. The characteristics of these two groups were very different: whereas the Esher district covered an area of almost 6,000 acres with a population of 7,000 and a rateable value of £75,000, the Tolworth division covered less than 2,000 acres, had a population of 1,700 and a rateable value of just over £10,000.

In addition to these two groups, it had already been agreed that



*Gen. Sir Orfeur Cavanagh  
last Chairman of the Lower  
Thames Valley Main Sewerage  
Board and Chairman of  
Kingston Rural Sanitary  
Authority 1875 - 1890.*

Hampton would be constituted a special drainage district using the Thames directly for its effluent whilst it was also assumed that West Molesey would be included in any scheme devised by its larger neighbour East Molesey. The LGB Inquiry proceeded without any controversy and the permission for the geographic groupings as well as £52,000 funding for the Esher Scheme was soon given.

In practice the effectively two-tier system of governance that existed in a Rural Sanitary Authority did not work as well as the single-tier system operating in a community governed by a Town Council, Improvement Commissioners or Local Board. Whereas the latter authorities had responsibility for all elements of their citizens' community welfare and spending, the RSA were only concerned with the sanitary affairs whilst the Vestry was responsible for all other aspects of community life. In practice this meant that, whilst the Kingston RSA were required by law to provide sewage systems for their various community groupings, they did not feel sufficiently empowered to require the communities to actually connect to, and use, the system. This division of authority would have serious implications for the success of the sanitary systems now due to be implemented.

## Esher and Thames Ditton - end 1890

Back in December 1885, soon after the demise of the LTVMSB, Esher Vestry under the Chairman William Sandford Hodgson had negotiated the purchase of two parcels of land amounting to a total of 34 acres for £10,240. The vendor was Edward Raphael and the land was located on the River Mole just north of Sandown Park Racecourse and the railway line. On Hodgson's initiative, Kingston Rural Sanitary Authority had appointed Baldwin Latham as their consultant engineer and, at the Public Inquiry in January 1887, Latham had explained how he had investigated the possibility of combining the Esher and Tolworth districts but the cost of traversing the intervening Ditton Hill - either by tunnelling through or pumping the sewage up and over - was prohibitive.

Work on the scheme began as soon as clearance for the funding was given. General Sir Orfeur Cavenagh laid the foundation stone for the buildings at the Sewage Works at a ceremony held on 7 March 1888 attended by representatives of the contractors and equipment suppliers as well as several dignitaries from neighbouring communities. The Engineer Baldwin Latham chose to use the occasion to promote his own choice of the use of hydraulic pumps over what he considered the inferior pneumatic system designed by his rival Isaac Shone. In the event it was his selection of this system and the failure of the original supplier to make them work properly which delayed the completion of the scheme by more than two years.

In December 1889 the assistant engineer admitted that

*Some of the hydraulic machinery had not yet been made to comply with the specified conditions, and the cylinders of three of the machines had been removed to Leeds for alterations.*

It seems these alterations were not effective for by June 1890, following a thorough inspection of the works, Baldwin Latham wrote a very detailed letter to the main contractors listing the defects that he had found and making it abundantly clear as to their financial and legal responsibilities to rectify the situation. Meanwhile house connections to the sewer network were continuing apace amidst growing dissatisfaction with the stench emanating from the manholes and ventilators. The pumping defect was finally resolved by Baldwin Latham himself producing a new design of hydraulic pump which was then entrusted to a different engineering firm to manufacture.



Above: The presence of Ditton Hill prevented the possibility of creating a combined scheme and necessitated the building of two sewage treatment works.

Right: Baldwin Latham CE, engineer of the Esher Scheme.

Below: Esher and Dittons Sewage Treatment Works.



At the same time he persuaded the RSA to agree to pay for an additional water supply to allow for flushing the sewers on a regular basis. By September 1889, 725 house connections had been made, leaving 625 properties still unconnected. This situation created a problem since, for each house, a trap and ventilating shaft had been provided for the house connection - but the trap needed to be permanently full of liquid for it to come into operation which would only be the case once the property was actually connected to the sewer. The RSA arranged for unused traps to be filled with water and later caps were fitted to prevent bad odours.

There was a flurry of activity and discussion at the 4<sup>th</sup> December 1890 meeting of the RSA caused by the imminent departure of Baldwin Latham to India. Although the Engineer attempted to persuade the RSA to take over the works before he left, it was decided unanimously not to do so until they were completed. The report of the meeting ended with the terse remark that

*Some of the members strongly condemned the conduct of Mr. W. S. Hodgson who forced the scheme and the engineer upon the district, and then when the crisis came backed out of the difficulty by retiring from the Authority.*

In its annual report on the past year's events in Esher published in its 17 December 1890 edition, the *Surrey Comet* reported

*At the beginning of the year the important works for the disposal of the sewage was still hanging fire, but everybody anticipated that a few months at least would complete the scheme. But as the year closes the scheme is still imperfect and the Engineer has taken his departure to India in spite of the protestations of the Rural Sanitary Authority. One of the members made a special ground of complaint that, after spending many thousands of pounds in the provision of a costly scheme, the Rural Sanitary Authority would not compel all the owners to connect their houses with the sewers. The majority of the Authority - with the concurrence of their clerk - based their refusal to take such a course upon the fact that it would be illegal even if it were desirable, and as to its desirability there was great diversity of opinion. To aggregate the difficulty there was a serious outbreak of diphtheria in the latter part of the year, which was freely attributed to neglect of the Authority; but careful investigation seems to point to local sanitary defects as the course of each separate case.*

The diphtheria outbreak continued into 1891 and many

residents were convinced that its arrival coincided with the opening of the Sewage Treatment Works and the commencement of connection of houses to the new sewer system. In April the RSA conducted a house-to-house inspection of all the homes that had not yet connected to the sewers whilst the following month the Engineer wrote to them claiming

*I hope in the course of a very short time now that the whole of the works will be handed over to your Board, as all the machinery is in thorough working order.*

The hope was still unfulfilled by the time the RSA Chairman addressed an Esher Vestry meeting in October 1891 and admitted that both the capital and running costs of the scheme greatly exceeded the Engineer's original estimate. He reported that

*The engineer now told them that the works would be in a satisfactory state so as to enable him to hand them over to the Board in the course of a month, and he hoped that this would be so ...*

Once again the deadline was missed - massively.

As the *Surrey Comet* annual review of 1891 said ...

*From the very commencement of the house connections being made, the inhabitants of Esher have made many and bitter complaints as to the intolerable stenches arising from the manholes and ventilators, most of which are in public highways. However it has been alleged by the Officers of the Rural Sanitary Authority that many of the residents in Esher have, in defiance of the regulations to the contrary, surreptitiously emptied the contents of their cesspools into the sewers and the stale sewage has caused the offensive smells complained of. One thing however which appears to be admitted is that the arrangements for flushing the sewers were very defective ... and that for months after houses began to be connected with the sewers there was nothing like efficient flushing. This was no doubt due to a laudable desire on the part of the Rural Sanitary Authority to keep the expenditure within reasonable limits but more than a year since the Sewerage scheme should have been completed ... the Rural Sanitary Authority have still not got a possession.*

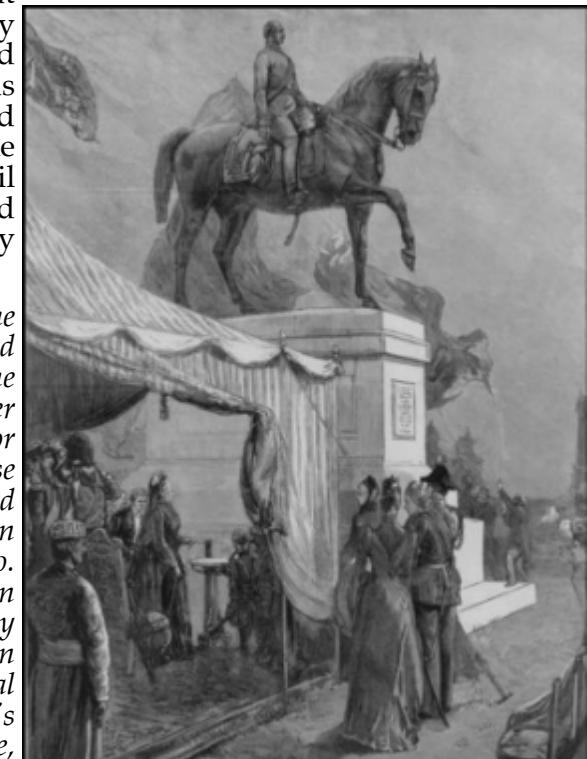
It was almost another whole year before the Chairman was finally able to report they had taken over the Esher works and that the whole workforce were now employees of the RSA.

## The Women's Jubilee Offering

A committee calling themselves The Women's Jubilee Offering was formed by a group of aristocratic women in order to present Queen Victoria with an especially grand present to mark her Golden Jubilee. They approached the Queen with a plan to sponsor a recreation of a Scottish equestrian statue of Prince Albert; the replica statue would be placed in Windsor Great Park. The Queen approved and, sufficient funds having been raised, she laid the foundation stone of the massive plinth on 15 July 1887. The new statue was created by Sir Joseph Edgar Boehm and was being cast at the Thames Ditton Foundry on Summer Road. It weighed eight tons. The Queen was due to unveil the completed memorial on 12 May. At the RSA meeting on 24 April 1890, a very concerned Thames Ditton Vestry member John Gosset

*complained that the contractors of the Esher and Dittons sewerage scheme had opened the Summer Road, Thames Ditton, for the purpose of making house connections, which he had understood had been completed some time ago. He moved that Mr. Baldwin Latham be informed by telegram and letter that in consequence of the removal from Mr. James Moore's foundry there of the statue, weighing eight tons, to be unveiled by Her Majesty in Windsor Park on the 12th proximo, it was necessary that the Summer road connections be completed and the road ready for heavy traffic by Saturday night next ...*

It was and she did.





Hampton Wick in 1895. As the inset (left) shows almost all the land was owned by the Crown (shown in green), leaving little scope to site a sewage treatment works.

## Hampton Wick - January 1891

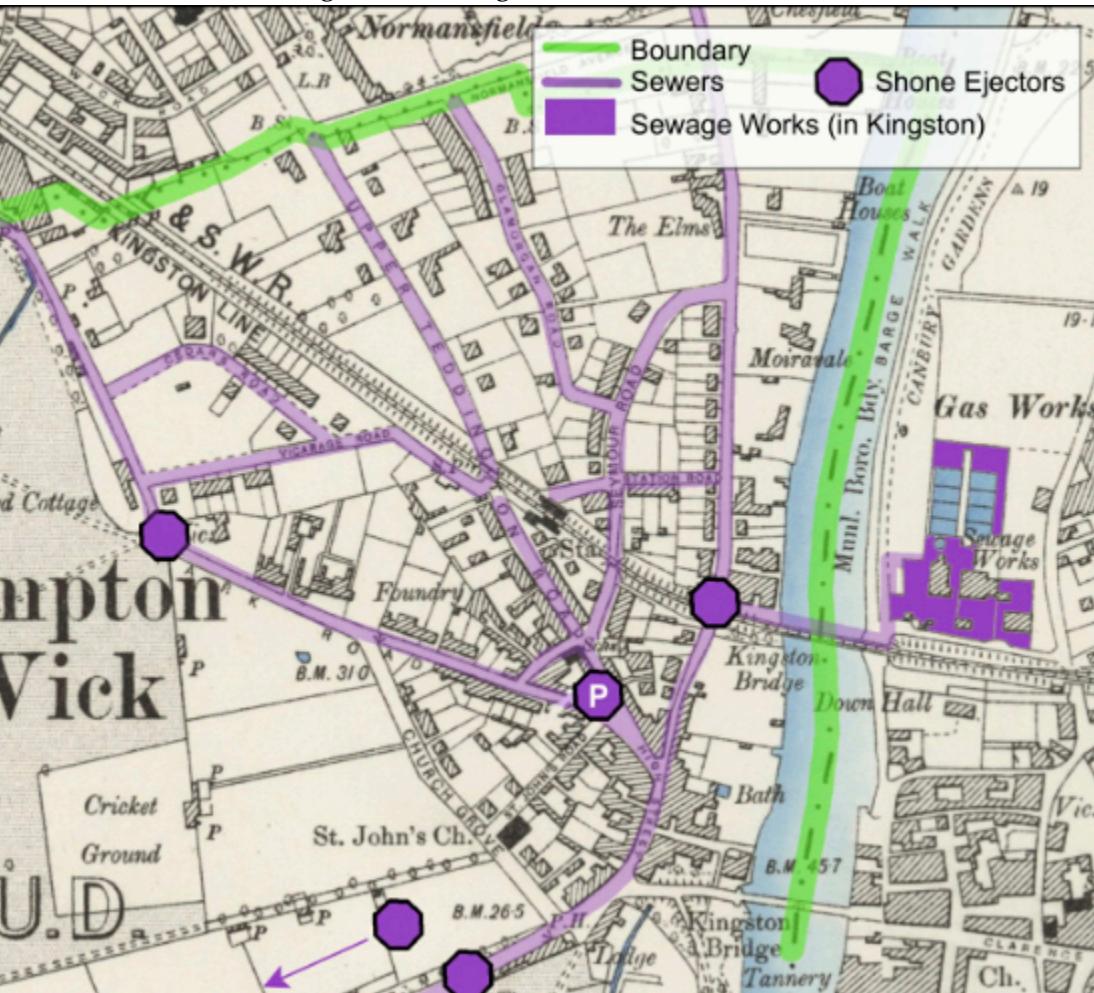
In 1863 Hampton Wick became the first of the local communities to form a Local Board to take control of a wider range of their parish affairs. The proposal for the formation of such a Board was tabled by Thomas James Nelson, a 45 year old recently-arrived resident of Hampton Wick who was the Solicitor to the City of London. The resolution in favour of adopting the Act was passed unanimously and the Hampton Wick Local Board held its first meeting on 22 June 1863.

The area administered by the new Board contained around 450 houses mainly in the north east part of the parish with some of the finest of these located along the riverside opposite what would become the site of Kingston's sewage treatment works.

In 1863, a basic system of sewers already existed in the village and around 40 houses were draining directly into the Thames which from 1866 would become illegal. Nelson was to play a pivotal role in the sanitary affairs of the Lower Thames Valley. Following the failure of the Surbiton Improvement Commissioners scheme in 1875, it was Nelson who promoted the formation of the Lower Thames Valley Main Sewerage District and, at the first meeting which took place in Kingston in December 1877, Nelson himself was voted into the chair a position he held with unanimous support until his death in February 1885, by which time the Sewage District was itself in its death throes.

Kingston Town Council had been bitterly opposed to its existence from the outset whilst Richmond became increasingly disillusioned. By 1885, both authorities were openly attempting to bring about the demise of the Joint Board via a Dissolution Bill promulgated in Parliament by Kingston Town Council. Opposition to that Bill came from Hampton Wick and from the Surbiton Improvement Commissioners. Whilst the Bill was in the House of Lords Committee stage, the opposition was withdrawn in return for an important concession made by Kingston to take and deal with the sewage of Hampton Wick and Surbiton on the same terms pro rata as their own. This was jointly negotiated by Charles Walpole of Surbiton and John Arthur Buckley, Nelson's replacement as chairman of the Local Board. Having achieved a solution for treating the sewage,

Buckley's other success came when the opportunity to provide an easy connection across the river into the planned works presented itself. Some years previously, the London & South West Railway Company had presented a Bill to Parliament seeking powers to create a new line from Kingston to Fulham. It was widely believed that this was purely an anti-competitive move and that the L&SWR had no intention to build such a line. Nevertheless when, in early 1886, the company were formally seeking Parliament's permission to abandon the plans, they were forced to make concessions to those such bodies as might otherwise oppose them. In March 1886, Buckley negotiated an improved rail service along with the provision of both a waiting room on the down-platform and a urinal on the up-platform. But most importantly L&SWR undertook that, if requested, they would carry sewage pipes on the side of their bridge across the river to Kingston's Sewage Treatment Works.



In Autumn 1884 Nelson had probably known the poor state of his own health and, recognising that none of the existing Board Members would be capable of delivering a sewage scheme to meet his own exacting standards, Nelson had persuaded the 59-year old Henry Parsons to join the Board. Parsons was the Surveyor to the London district of Lambeth and Camberwell and his external perspective and inside knowledge of the workings of other local authorities was clearly valued by Nelson. As a member - and soon-Chairman - of the Hampton Wick Local Board, Parsons adopted a very much hands-on, authoritarian approach, similar to that of his sponsor. Though not necessarily a popular colleague and chairman, Parsons nevertheless proved effective in getting things done and ultimately fulfilled Nelson's faith in him.

At their meeting on 1 February 1886, the Local Board had appointed six members to a new Drainage Committee

*to make the necessary preliminary enquiries as to the most advantageous method of carrying out the public drainage of the parish.*

The subject of Drainage thereafter disappeared from the regular Board Meetings until the First Report of the Drainage Committee was received and considered at a Special Meeting of the Board held almost exactly two years later on 30 January 1888. The content and conduct of the Drainage Committee meetings can only be guessed at since no minutes were kept nor were proceedings reported in the press. It was simply recorded that the six members of the Drainage Committee had met a total 16 times over the two years. The Minute Book for 30 January 1888 simply says

*the 37-page printed report (which was bound into the Minute Book itself) was received and adopted by a majority of 7 votes to 2.*

All members present signed the report including the two people voting against its adoption - one of which was the immediately past chairman J Arthur Buckley.

The Drainage sub-committee was now authorised to complete the negotiations with Kingston and report back to the Board. More than 20 years of local democratic effort, anxiety and frustration were finally brought to an end by the concluding paragraph of the sub-committee's report:

*We could have desired better terms, but as there is no probability of obtaining them from Kingston, and as we are of opinion that there is no other scheme which will offer equal advantages, we recommend to the Board that an undertaking be given to sign and seal the agreement as soon as the Local Government Board shall enable us to borrow the necessary capital.*

The recommendation was adopted unanimously.

The finishing touches to the design of the sewer network were approved at a Special Board Meeting on 26 May 1888 and it was resolved to apply immediately to the Local Government Board for permission to borrow £8,000 with repayment spread over 50 years.

## TRIAL BY LOCAL GOVERNMENT BOARD

The Local Government Board held its Inquiry on 20 June 1888 at the Local Board Office. Apart from the Hampton Wick Board team and their consulting engineer Isaac Shone, attendees included a delegation from Kingston Corporation and several local ratepayers. The Inquiry lasted four hours and closed without any apparent major controversies. Indeed, at the next Local Board meeting, Parsons reported that, at the end of the Inquiry, the Inspector had given him to understand he was perfectly satisfied and that permission to borrow would be duly forthcoming.

However, subsequent events did not justify that confident forecast and the road from Inquiry to final resolution proved to be very long and eventful.

By their September 3rd Board Meeting, Hampton Wick had still heard no outcome from the Inquiry. So why was an apparently straightforward application, heard at an Inquiry that had itself passed off seemingly calmly, now gradually turning into a protracted and punishing bureaucratic nightmare? The *Surrey Comet* leader writer on the 6 October 1888 had no doubts about the reason:

*The Local Government Board have undoubtedly long had a keen desire to intermeddle with the sewerage scheme of the Corporation of Kingston. That the Corporation should have dared to have raised monies for the construction of sewage works without having first obtained the formal consent of the*

*great central authority, has been a source of irritation to the officials who compose it; and it would seem that at last they have found an opportunity of venting their spleen.*

It is certainly true that Kingston went out of its way to avoid involving the Local Government Board with its latest scheme, even to the extent that, rather than Kingston applying for permission to borrow the large capital sum involved, if instead required the selected contractor to fund his own work and agree to receive payment as an annuity spread over 25 years. Whilst not totally unheard-of, such an arrangement would certainly have been considered fairly extreme.

Hampton Wick however had no option but to play by the rules and apply to the LGB for permission to borrow in the conventional way. In return for this they were turned into the whipping boy for Kingston's audacity.

It was not until 5 January 1889 that Parsons finally received a letter of permission from the LGB although this too came with a set of further costly conditions. The Local Board were finally in a position to invite tenders for the scheme they had devised over 12 months previously. A dozen tenders were received for the main contract for the construction of the sewer network itself and six for the construction of the four ejector chambers. In both cases the lowest tender was from William Cunliffe of Dorking who, as well as offering the lowest price, came highly recommended as having been the main contractor for both the Kingston and Surbiton sewer schemes together with the Kingston Sewage Treatment Works. All of those contracts had been delivered impeccably and without a single dispute arising. Cunliffe was duly awarded both Hampton Wick contracts.

Work began immediately and the Surveyor gave the Board regular reports of steady progress with nothing more than minor problems to be resolved. By the October 1890 Board meeting, the Drainage Committee reported that "for all practical purposes the new sewers were complete.

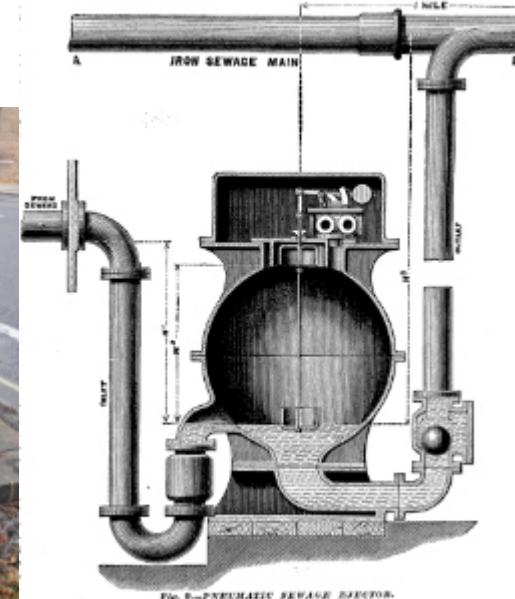
There was no official opening ceremony but the *Surrey Comet* marked the event with an article in their 28 February 1891 edition:

## COMPLETION OF THE SEWERAGE SCHEME

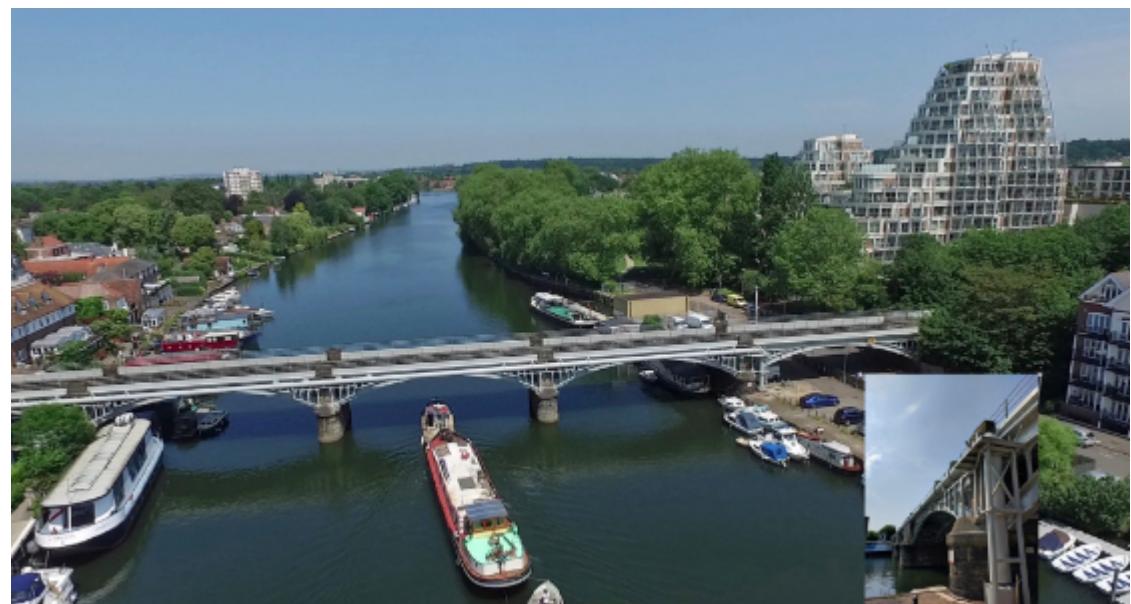
The new sewers are now completed, and the system may be said to be in operation, for some 50 connections have been made, and the sewage is being delivered to the Kingston works. The system adopted is Shone's "Hydro-Pneumatic," of which the following is a brief description. The power required for compressing the air is derived from two 6-h.p. nominal gas engines, running alternately, and situate in the compressing station at the rear of the schools. The air is delivered into a receiver, 14ft. by 4ft., and is conducted to the four ejector chambers in cast-iron pipes. These chambers are situated in the following positions: No. 1, opposite Lancaster-lodge, Hampton Court-road; No. 1a, in the same road, nearer Hampton Wick; No. 2, at the Park-gate, Park- road, and No. 3, by the malt-houses, Lower Teddington-road. The sewage from Hampton Court gravitates to No. 1 ejector, and is then raised 16ft., gravitating to No. 1a where it is again raised 13ft., and flows by gravitation to No. 3. The sewage from the Upper Teddington-road, Cedars Park Estate, and Sandy-lane, falls into No. 2 ejector, and is raised 17ft., gravitating again to No. 3, where the whole is finally lifted some 28ft. on to the railway bridge, and delivered through 8in. cast-iron pipes ... to the works at Kingston for treatment.

The 50 house connections reported in February 1891 had grown to 271 out of a total of 452 houses by March 1892 and the Board were increasingly using their powers of compulsion to force the remaining householders to connect.

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The two elements mentioned in the *Surrey Comet* article are still key parts - albeit updated - of the Hampton Wick sewerage system. All four ejector chambers are still in operation although the hydro-pneumatic system has long since been replaced by electric motors. There is now a single 24-inch steel pipe on the side of the bridge, replacing the multiple 8-inch cast-iron pipes of the original link and the line now extended to the Hogsmill Treatment works on Lower Marsh Lane, Kingston.





1865 map showing Richmond Select Vestry and the four members of the Richmond Rural Sanitary Authority.

## Richmond on Thames - September 1891

Richmond was the most northerly of the towns in the Lower Thames Valley area. The acreage of the civil parish was 1,256 of which 557 belonged to the Crown, including 67 acres within Richmond Park, 353 in the Old Deer Park, and 137 in Kew Gardens. The river flows around the town on three sides as it passes East Twickenham, Isleworth, Syon Park, Kew and Chiswick on its opposite bank. In line with Government policy of the *1847 Towns Improvement Clauses Act* by which local authorities were encouraged to build public sewers and were also given specific powers for these sewers

*to communicate with and empty themselves into the sea,  
or any public river,*

Richmond had around 24 such sewage outlets discharging directly into the Thames. A number of those were small pipes from individual houses but they also included seven main sewer outlets.

The *Thames Navigation Act 1866* totally reversed previous Government policy and specifically forbade any authority to use the river for sewage drainage. Finding themselves liable for swingeing fines under the new law, Richmond Vestry attempted to secure a portion of Old Deer Park for drainage purposes but, although supported by some members of the House of Lords, the Crown totally refused to entertain such an idea - they were not, it seems, amused ...

The population of Richmond in 1870 was 10,000. With irrigation ("sewage farming") currently being the preferred method of treatment, this would have required the availability of around 150 acres allowing for reasonable future population growth. The impossibility of finding such a site within the town boundary led to the Vestry creating a Special Sewage Committee which proposed to purchase the 224-acre Blagdon Farm which was located seven miles from Richmond town centre at New Malden. A Public Inquiry was held by the Local Government Board but, with strong opposition coming from both the New Malden and Kingston authorities, permission was refused.

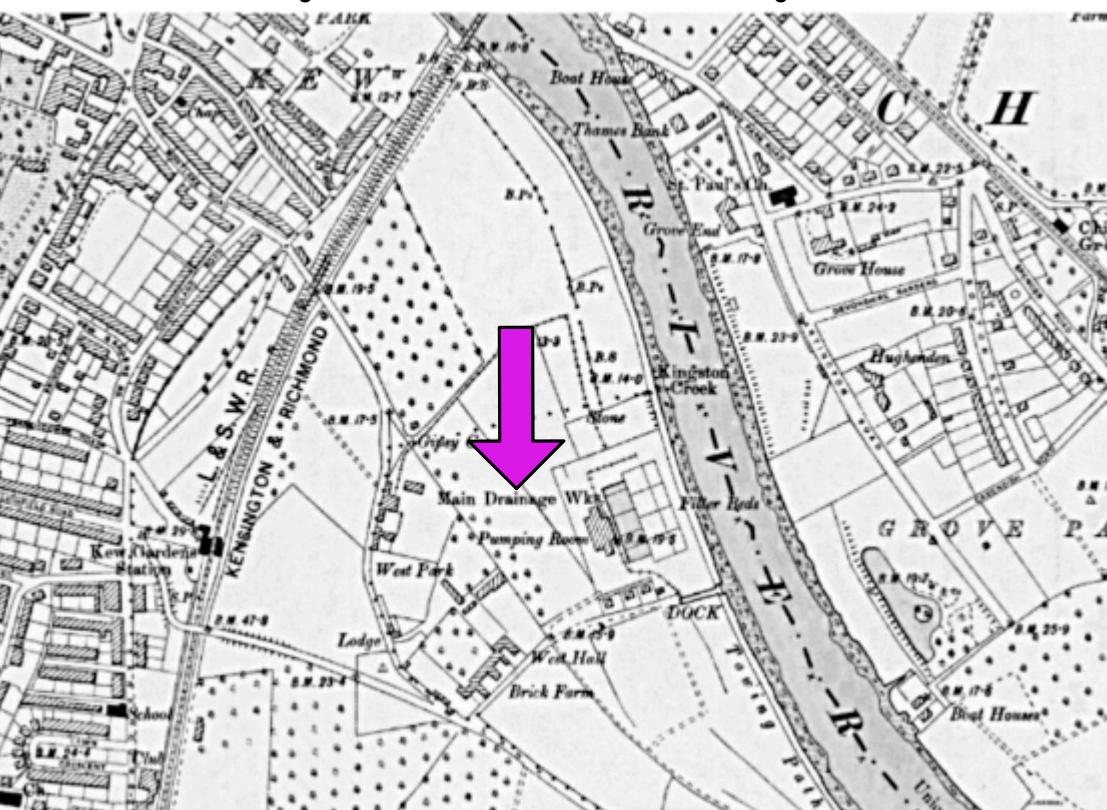
By 1878 Richmond Select Vestry had turned their attention to disposing of the sewage using the precipitation process. By separating the solid and liquid elements of sewage and processing them separately, the approach dramatically reduced the area needed for the treatment works but, even though they obtained LGB approval of their scheme, Richmond abandoned the project over concerns that, at that time, no other authority had successfully dealt with the difficulty of getting rid of the final deposit - technically called sludge.

Events then overtook them and Richmond became - seemingly willingly - members of the Lower Thames Valley Main Sewerage Board. Their enthusiasm eventually waned and they became committed though clandestine supporters of Kingston's campaign to dissolve the Joint Board.

\*

Arguably Richmond emerged from the wreckage of the LTVMSB debacle in a better situation than any other authority by virtue of the fact that the last scheme to be considered by that body shortly before its demise was devised by John Charles

*The Drainage Works of the Joint Richmond Sewerage scheme.*



Melliss and based on a precipitation treatment works to located at Mortlake. Not only was it fully specified and costed but the Local Government Board had given it their approval. Nevertheless a Special Vestry meeting was held in November 1885 to consider the Melliss scheme alongside five other alternatives all of which however would locate the treatment works outside the area covered by the Richmond Urban or Rural Sanitary authorities. This was considered to be unwise and the Melliss scheme was adopted by 19 votes to 6 at a Special Vestry Meeting on 13 November 1885. Shortly after, the Rural Sanitary Authority confirmed their desire to collaborate on the hitherto Vestry-led project. The scheme having been fully developed and costed, the two authorities made a joint application to the Local Government Board in November 1886 to borrow the £100,000 required. Although this was forthcoming, the LGB ruled that the Rural and Urban sanitary authorities would need to act separately in borrowing their share of the sum agreed to, the split being five-ninths to Urban four-ninths to Rural. This prompted the two authorities 1887 to jointly sponsor a Parliamentary Bill allowing them to form a single body - the Joint Main Sewerage Board - specifically to carry out the main sewerage of Richmond, Kew, Barnes, Mortlake and Petersham.

By January 1888 Melliss had prepared the detailed specifications and copies of the invitation to tender separately for the works and the mains sewers had been taken by 15 contractors. Both contracts were to be completed by 1 March 1890. In the event the same contractor was awarded both contracts based on submitting the lowest tenders for each. Work finally started in August 1888 but progress was slow and was being hampered by poor communications between the engineer and contractor. By June 1889 Melliss requested that an overseer be appointed for the sewer contract and there were big discrepancies between what the sewer contractor claimed he had completed and should be paid for versus what Melliss would agree to. By October 180 men were working on the sewer contract and 39 on the works contract.

But by December 1889 the *Surrey Comet* reported that

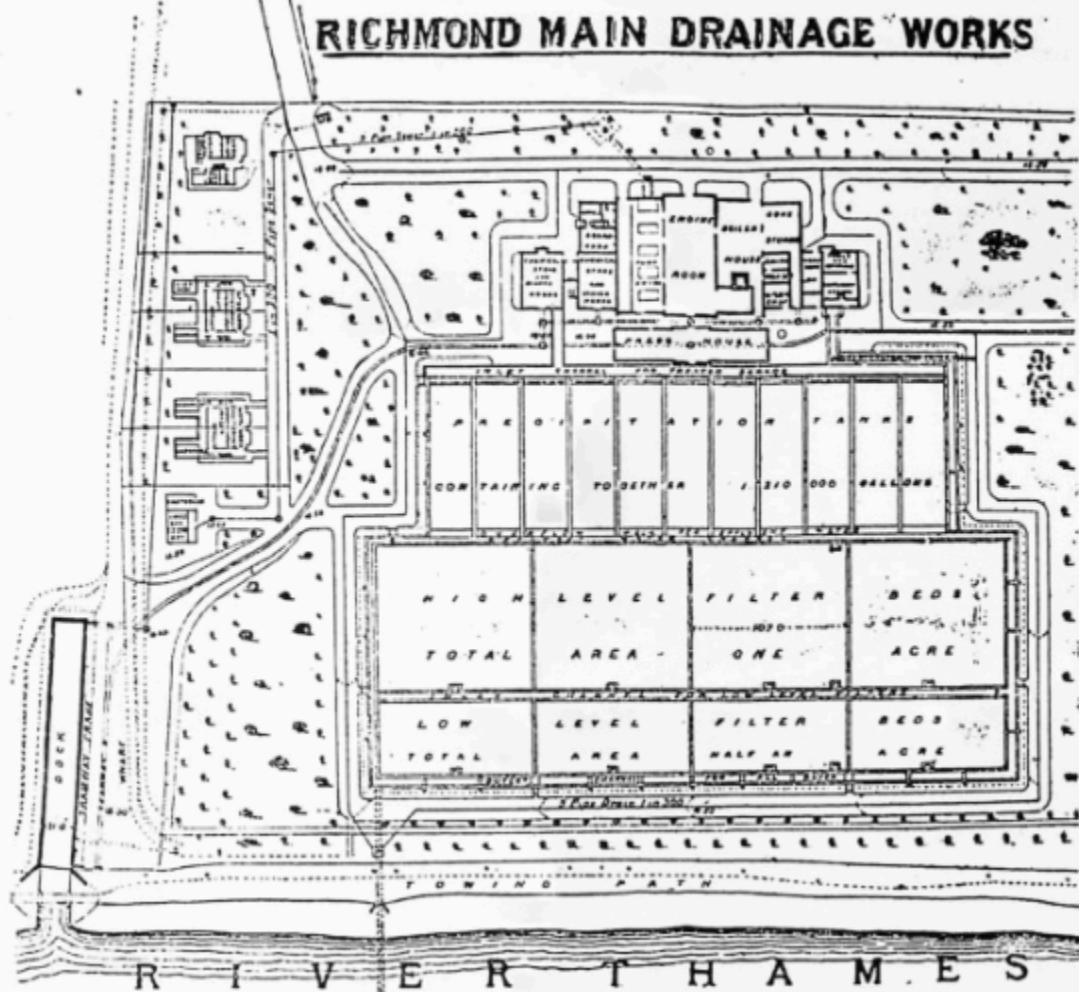
*Work on the sewers has virtually stopped and there is no hope of completing by 1 March 1890. The Board strategy is to wait until then, the contractor will thereby have forfeited the job and the Board can call in the surety.*

## RICHMOND MAIN DRAINAGE WORKS

The following month work on the outfall works also stopped. Gradually the picture of what had really been going on began to emerge. Aided first by a letter and later by a personal visit in August 1891 from the President of the Navvies', Bricklayers' and General Labourer's Union (accompanied by two of his Union members who were employed by the Contractor), it emerged that the Clerk of Works, who had been hired at Melliss' insistence, had simply been taking the sub-Contractor's word for what had been completed and was providing confirmatory reports without bothering to verify the real status. Worse, the Board's Surveyor was simply countersigning these reports without even reading them whilst at the same time issuing certificates for payments to the contractor. It emerged that, except near the manholes where they would be visible, the sewer pipes in two of the main lines of sewers had been laid without any bed or covering of concrete as required by the contract.

To assess the extent and impact of these faults, the Council brought in James Lemon CE, a respected external engineer to examine the status of these two lines and make recommendations for what needed to be done to resolve the issues. After a detailed examination which included personally crawling along the length of the sewers, Lemon provided his report on 1 September 1891 in which he advised that certain sections be completely relaid using the concrete protection specified in the original contract at a total cost around £5,000. The Council gave the contractor notice to reconstruct these sewers at his own expense but he had become bankrupt and the Council themselves took over the contract. However, it seems that, since the Council had not paid the contractor all the money due to him, their loss was "limited" to £1,500. As if by way of closure on the whole episode, the Council also demanded the resignations of both the Clerk of Works and their long-serving Borough Surveyor.

Melliss, whilst confirming that the leakage of subsoil water into the sewer system was well beyond what had been envisaged, now proposed two pragmatic solutions to the problem: firstly by asking the Rural Sanitary Authority to agree to limit the influx of rainwater from their sewers and secondly by permanently engaging what had been otherwise been designated stand-by pumping capacity at the Treatment Works. The two proposals saved the day and it was a somewhat relieved Joint Main Sewerage Board that agreed to plan an



opening ceremony at the end of the month.

The works were opened by Charles Ritchie, President of the Board of Trade, at a ceremony on 29th September 1891 with the *Surrey Comet* carrying a detailed description of the history, layout and operation of the scheme:

The works for dealing with the sewage of the united district of Barnes, Kew, Mortlake, Petersham and Richmond are practically completed. They are situated in the parish of Mortlake, by the riverside, a short distance below the railway bridge between Kew Gardens and Gunnersbury stations. They were commenced in August 1888 by Mr Charles Dickinson, contractor, of Loughborough whose tenders for both the works and the main sewers were lowest sent in. The tenders for the sewers were £40,666 and

for the works for the clarification and disposal of the sewage £30,930. As is well-known, Mr Dickinson, after great delay had taken place, practically threw up his contracts about the end of 1889, leaving the sewers about half finished though the works were much more advanced. After some little time, during which the Main Sewerage Board carried on the work through their engineer, Mr J C Mellis, the contracts were taken up by the two well-known contractors Messrs Nowell and Robson of London who completed the sewers whilst the works were finished by Messrs Webster and Co of London on behalf of Mr Dickinson's sureties.

The site of the Works comprises about eleven acres, but only seven acres are actually to be used at present for the treatment of the sewage. The works were designed in 1885, nearly 6 years ago, by Mr JC Mellis CE and the estimated cost at the time was £100,000. Since then the cost of all kinds of work has largely increased and many difficulties have been encountered during the progress of the works, so that this estimate will be considerably increased. It is pretty certain, however, that £15,000 - which is 15% of the cost - will cover the whole extra outlay. It was estimated that the entire cost would entail a rate of 7<sup>1/2</sup>d in the £ and it is not likely it will much exceed this. The population of the united district to be served at the last census in 1881 was 34,000 and the design was based on an ultimate population of 80,000. It is calculated that when the entire district is built upon it cannot accommodate more than that number. The area to be drained amounts to about 5,000 acres.

The main intercepting sewers of the Board are nearly 5 miles in length. They are constructed chiefly in the London clay and have been mainly put in by means of tunnels driven through the clay, but in some places they passed through the sand and gravel water-bearing strata of the district. They vary in-depth from 20 feet to 45 feet below the surface of the ground and carry the sewage by gravitation from the most distant part of Petersham adjoining Ham on the one side and the most distant part of Barnes at Hammersmith Bridge on the other side together

with the sewage from Richmond, Mortlake and Kew, all being brought together at the works at a spot 25ft below ordnance datum. From thence the sewage will be lifted to a height of 43 ft into the works. The estimated present volume of sewage in dry weather is 2 1/2 million gallons per day, and in wet weather it is expected that this will be more than doubled reaching 5 1/2 million gallons a day. To lift this, together with a reasonable increase in the future, 3 sets of simple acting plunger pumps are provided. Each set is capable of lifting about four million gallons per day so that one set of pumps will suffice for fine and moderate wet weather work, while a second set can be called into use for additional work in very wet weather. The third set will be held in reserve in case anything should go wrong with either of the other two sets. There is besides space in the buildings to accommodate two more sets of pumps if in the future they should be required. The boiler power is also calculated well in advance of present requirements. There are three of Galloway's boilers each 18 ft long by 6-ft 6-in diameter, any one of which will do the fine and moderate weather work. The other two will of course be available when wanted, as in the case of the pumps. There is besides space in the same building for an additional boiler, if in the future it should be needed. There are three 50 horsepower engines to work the pumps, and very fine engines they are, of the latest pattern, made and erected by Messrs James Simpson and Co., of Pimlico.

The sewage as it passes from the sewers into the works will flow through a straining chamber, where all obstructive particles will be arrested. These will be taken out - a trifling amount per day - and buried in the ground round the Works. The sewage will then run into a huge underground chamber, in which the three pumps referred to above are to operate. Chemicals will here be introduced, and in the process of pumping the sewage to a higher level, that too will become thoroughly mixed. Flowing around a covered channel the sewage will pass through a mixing chamber, where more chemicals will be introduced, and finally reach a long broad channel which extends the whole length of the precipitating tanks. These tanks are eleven in

number, and each is capable of holding 110,000 gallons. The sewage can be admitted at will to any tank by means of valves opened and closed by a lever. The tanks are faced with blue brick concrete, the dividing walls being covered on the top with glazed bricks. The sewage will rapidly settle, and when the tanks are in use it is calculated that at the further end there will always be a depth of clear water on the top to the extent of an inch. As soon as the sewage in a tank obtains a depth of 5ft. 9in., the clear water will commence to run over the weir at the further end into a channel communicating with the Thames direct and also with the filters. The sewage will flow into the tanks at such a rate that not more than half an inch of water can flow over the weir. When it is thought desirable to clean out the tanks the water can be quietly drawn off by means of openings regulated by floating valves. The mud or sludge left at the bottom, it is expected will amount to a depth of about 9 inches, and it will be drawn off by powerful pumps into the sludge pressing house, where, after lime has been added, it will be forced into sludge pressing machines where all the water will be squeezed out and the sludge left hard and dry in inoffensive cakes, which can easily be removed. The water extracted will run back into the tanks for re-treatment. It is anticipated that the water flowing from the tanks will be sufficiently clarified to meet the requirements of the Thames Conservancy, and that it may be discharged into the Thames without further treatment. If the effluent, however, is not considered pure enough there are two immense filters, the first an acre in extent and the second, at the lower level, half the size. The filtering bed is covered with two layers of earthenware pipes, one laid crosswise on the other. Above this are layers of fine sand, gravel, carbon and mould. At the time our representative visited the Works the filter beds had become covered with weed and grass, principally the former. The grass is desirable but the weeds are not and before sewage effluent can be filtered, the weed will have to be removed. The effluent will be discharged by gravitation except when the tide rises to the level of the exit channel. In that case the head of the channel will be closed and the effluent may

either be stored until the tide goes down, or may be forcibly discharged by means of two large Worthington steam pumps. The latter expedient will only be resorted to when the storage capacity has become exhausted.

In addition to the machinery mentioned there are two 15 horsepower engines for mixing and workshop purposes, and a Worthington steam pump for lifting water. The works comprise, in addition to the buildings already referred to, workshops, workmen's rooms, five cottages (for the foreman and four workmen to live on the premises), a dock and wharf, tramways, stable etc. The cottages and stables have been built by Mr George Wade of Chelsea and very well has he done his work. The works are fenced completely around. The arrangements for the consumption of smoke have proved very successful, for the boilers have been at work for the past two months, and we understand that no smoke has yet to be seen to issue from the chimney.

The works are of excellent design, being compact and yet ample in accommodation. Every possible contingency seems to have been provided for, and regard has been had to the convenience of management, simplicity, and the absolute efficiency. It appears to be quite impossible that there should be any breakdown, so well has the scheme being devised and carried out.

## **Southborough, Tolworth and Hook - end-1891**

It was anyway inevitable that the area known as the Rural Sanitary Authority 1 District - comprising Hook, the Tolworth division of the parish of Long Ditton and the Southborough portion of the parish of Kingston - would have a more difficult task in solving their drainage challenges than their wealthier and more populous neighbours in Esher and Thames Ditton to their west. Nevertheless the errors made in costings and assumptions of proceeds from the rates made the challenges almost appear to be insuperable.

The Rural Sanitary Authority had commissioned John Charles Melliss CE to devise a drainage scheme for the Rural Sanitary Authority 1 District. He estimated his solution would cost £12,299 and on that basis the LGB held a Public Inquiry and sanctioned the raising of the loan. However, the actual tenders received ranged from £15,277 to £24,054. Worse was the fact that Melliss had estimated that the product of a penny rate would be £46 whereas, allowing for the fact that the large amount of agricultural land in the District was rated at just a farthing rather than a penny, the yield would be more like £33. The scheme seemed unworkable and, to make matters worse, even if it were now dropped, the population would be saddled with the cost both of the Public Inquiry and Melliss' charges for devising his scheme. A Public Meeting was held in August 1888 which passed a resolution

*That this meeting whilst it is of the opinion that a scheme of drainage scheme is urgently needed for the districts of Hook, Tolworth and Southborough, considers that the expenses of the scheme proposed by Mr Melliss far too great and trusts that the Rural Sanitary Authority will at once stop all proceedings for carrying it out*

and a delegation attended the Rural Sanitary Authority Meeting held the following day with three propositions:

1. *that no further action should be taken with the then existing scheme*
2. *that a parochial committee should be appointed with power to act in the matter of providing an alternative scheme;*

3. *such committee should be empowered to spend up to £100 in obtaining professional advice to assist them.*

The Rural Sanitary Authority refused all three requests and said in effect

*we will not allow you to stop the scheme, we will not allow you to have a parochial committee and we will not allow you to spend any money in seeing whether any other scheme can be found.*

The Rural Sanitary Authority had applied to the Local Government Board for further funding for the Melliss Scheme and, in an attempt to counter this, members of the Ratepayer's Committee met with the LGB Inspector on 6 October 1888 and presented him with three petitions each signed by more than 90% of the ratepayers and representing more than 90% of the rateable value in each of the three districts. The strategy was successful for, in the face of this evidence, the Inspector declined to advise the Local Government Board to sanction the application for further funding for the Melliss scheme.

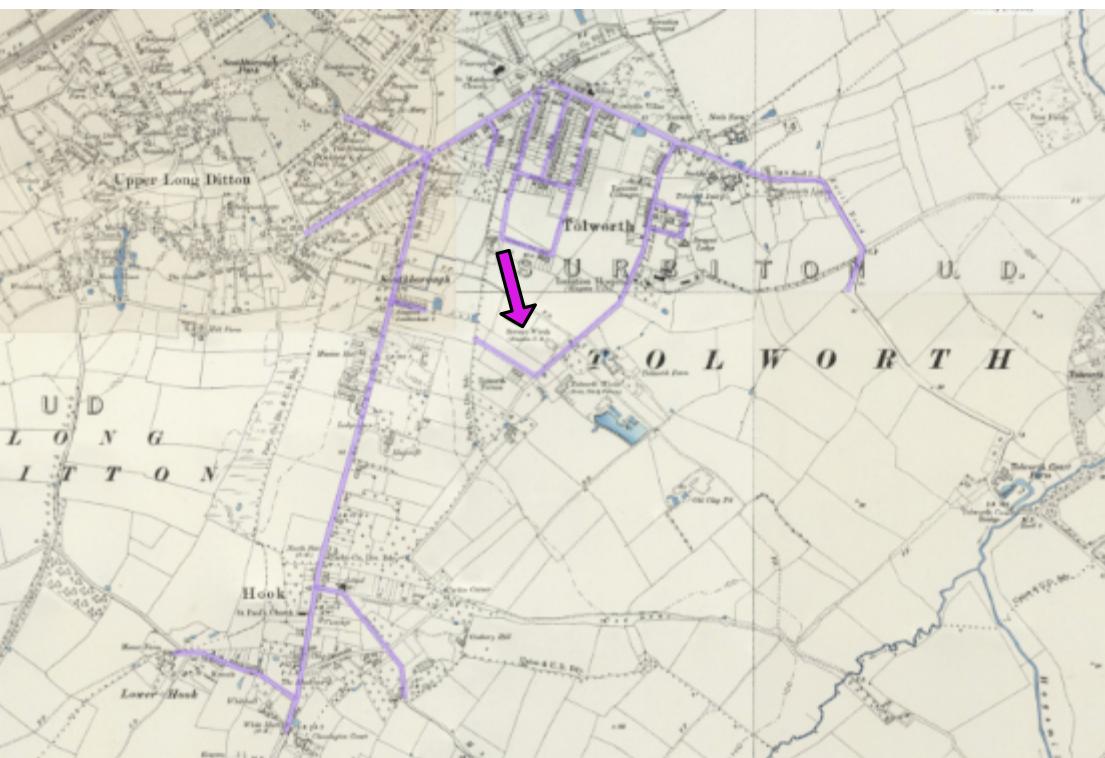
Realising the strength of feeling that now existed, the Rural Sanitary Authority modified its stance, promising not to incur any further expense or to submit to the Local Government Board any new or revised scheme without acquainting the chairman of the ratepayers meeting with details of it, and committing that any remarks he might make would receive careful consideration. At the same time they instructed William Hope, their own Surveyor, to devise a cheaper alternative to the original Melliss scheme. The new proposals were ready by the end of the year and, having reviewed and approved them, the Rural Sanitary Authority honoured their commitment by agreeing that Hope should present his scheme to a well-attended Public Meeting held on 20 February 1889. The attendees received a detailed explanation of the routes that would be taken by the main sewers. William Hope was at pains to explain that, in order to reduce costs compared to the previously proposed scheme, certain areas were no longer included - notably Worcester Park to the east and Chessington to the south.

After a lengthy discussion, the plans were thoroughly endorsed by the Public Meeting and a motion was passed that

*the Ratepayer's Committee thoroughly endorses the Hope scheme provided the estimates on which that scheme was based - which estimates indicate will be covered by a rate of 3s in the £ - are found to be approximately correct.*

Having honoured their commitment to Ratepayer's Committee and received their ringing endorsement, the Rural Sanitary Authority completed their design details and in due course the expenditure was agreed by the Local Government Board following the usual Public Inquiry. Work commenced immediately and continued steadily throughout the next two years. Progress was relatively swift and the scheme was completed and operational by the end of 1891.

*William Hope's alternative sewerage scheme for the Southborough/Tolworth/Hook communities*



## Teddington - March 1893

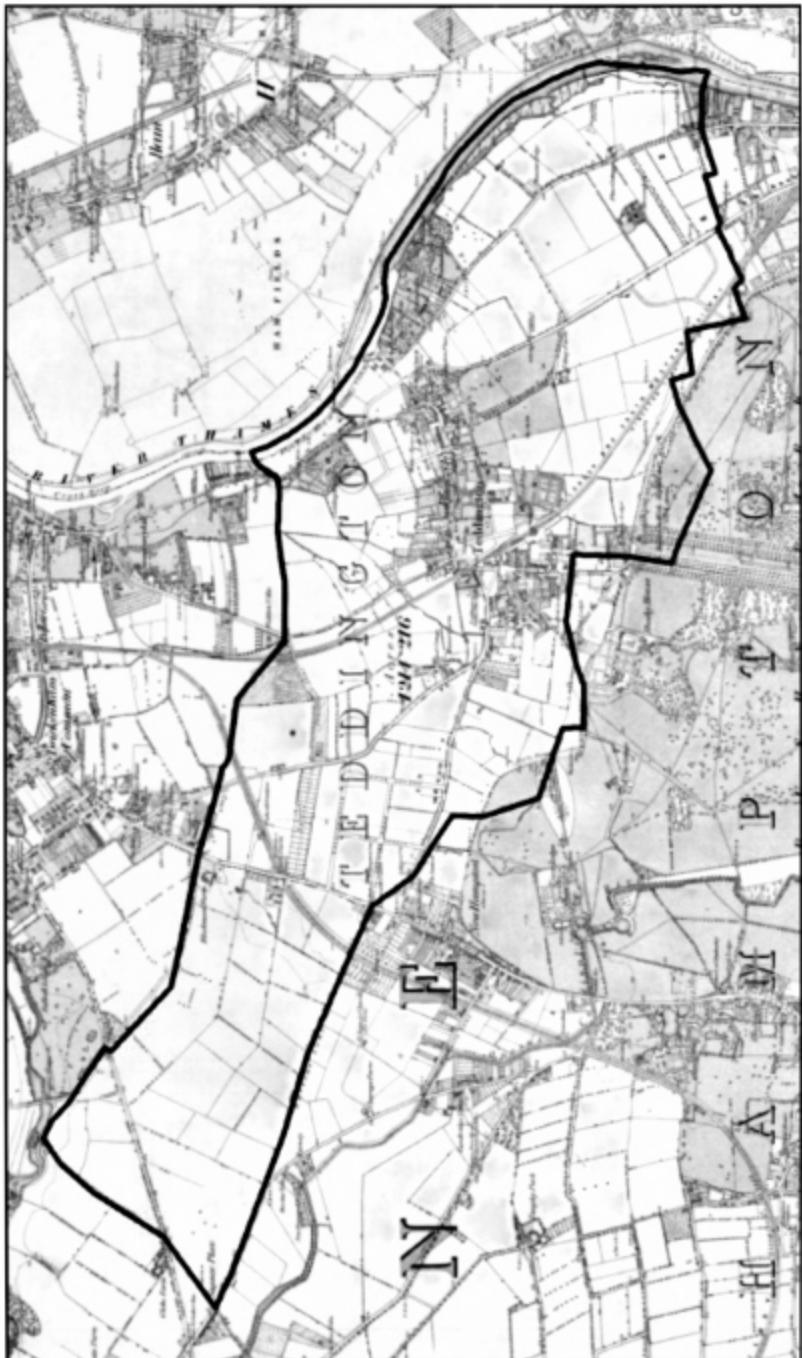
The ancient town of Teddington with its eleventh-century origins lies on the river bank to the south of Twickenham. In the earlier days many of the houses had their drains connected directly into the Thames by means of the ditches or small water-courses which intersected the parish. These inevitably became a nuisance and were often built over. The resulting culverts were the earliest form of sewerage in the parish, and later became the basis of a comprehensive system of storm water sewers.

The village grew up around the church and manor house both of which stood near the river at the corner of High Street and Twickenham Road. In 1861 the population was 1,183 living in 254 houses. Soon after, the large estate of the lord of the manor came onto the market and two railway lines opened through Teddington (in 1863 and 1864). By 1871, the population had become 4,063 living in 1,034 houses. The rapid growth continued and the population had already exceeded 10,000 before 1891.

Domestic sanitation systems (using the cesspool) existed throughout the district. Teddington was unique amongst the neighbouring local authorities in having no sewage draining directly into the river and therefore - unlike their neighbours Twickenham and Hampton Wick - they were under no immediate threat from the Thames Conservators.

Adoption of the Local Government Act 1858 leading to the formation of a Local Board was not the smooth and swift process it had been in neighbouring Hampton Wick and it was not until 9 May 1867 that a public meeting voted 17 to 9 in favour of adopting the Act and the new Local Board held its first meeting on 12 August 1867. Those in favour of forming a Local Board back in 1864 had cited as a main advantage that it would give the community the ability to borrow money to improve its poor drainage. Surprisingly the issue never featured to any great extent in early Board discussions and anyway, in October 1877, the Teddington Local Board was corralled into membership of the Lower Thames Valley Joint Sewage Board and it was not until July 1885 that the question of drainage reverted to local control.

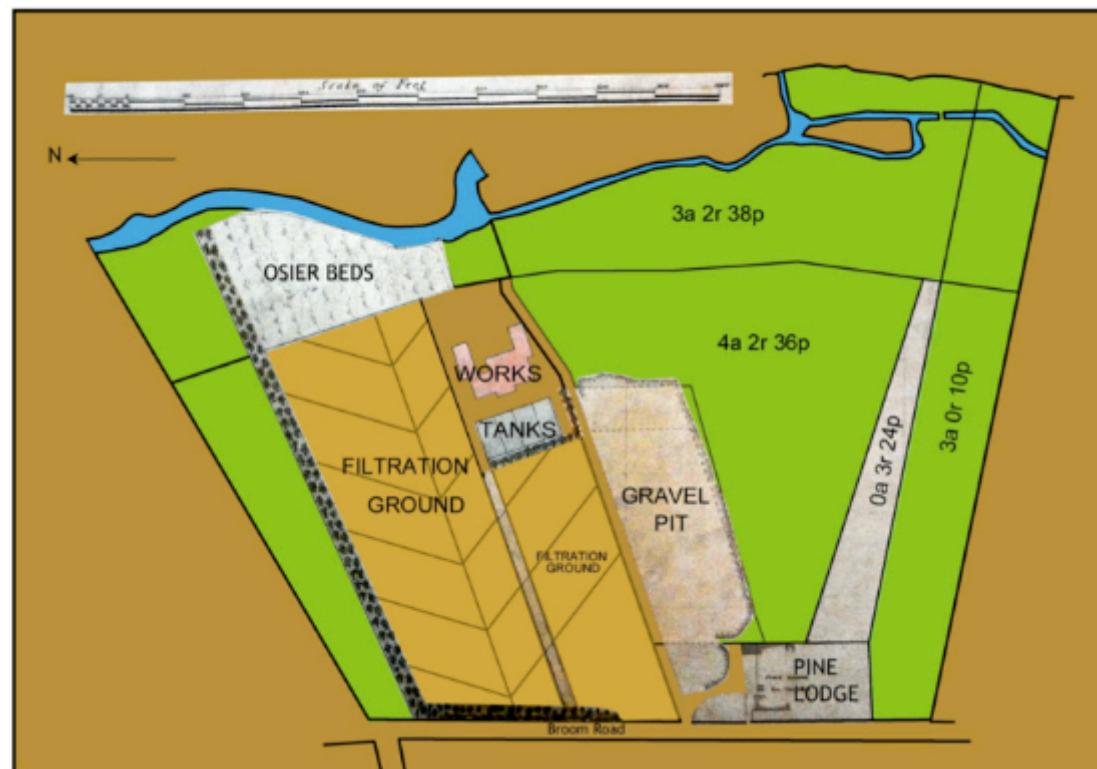
Initially there was little appetite for action since they were under no compulsion from the Thames Conservators to take any action as their system based on cesspools did not pollute the river.



Teddington in 1868 when the Local Board was formed. Most of the population of 10,000 live along the High Street and around the newly-arrived Teddington railway station.

However in 1887 the Board's Surveyor was instructed to prepare a scheme for the sewerage of Teddington and John Charles Melliss was appointed Consulting Engineer. The preferred location for the treatment of the sewage was a 25 acre site in the south-east of the village which ran down to the river and included a gravel pit which the Board were already exploiting. Several local residents objected to the Board's proposal and had engaged a barrister to represent them, but the Chairman of the Teddington Local Board succeeded in finding a way round the difficulty by privately agreeing terms to purchase all 25 acres direct with the former owner's executors. The purchase price agreed was £10,000 which represented a very reasonable £400 per acre and, with the site for the treatment works assured, detailed planning could now go ahead.

A plan of the land purchased by Teddington Local Board in 1888 showing the eventual layout of the treatment works.



Henry York, the 29-year-old Surveyor to the Teddington Local Board, prepared a detailed description of the drainage scheme he had devised with input from the Consulting Engineer. The following are extracts from the report (see map on page 116):

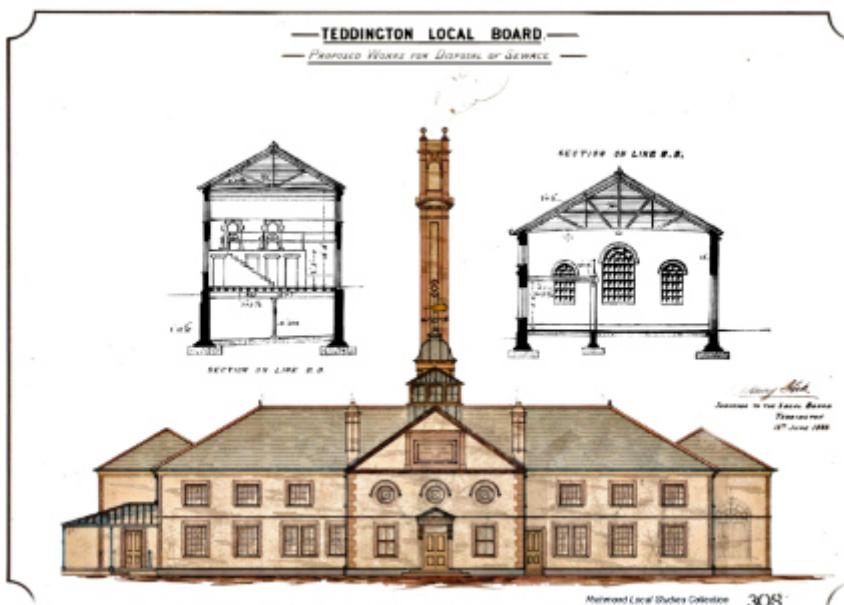
*The parish is considered to be divided into three parts.*

*First – that part lying west of the railway line (Shepperton Branch).*

*Second – that part lying between the Shepperton and Kingston railway lines.*

*Third that part lying east of the Kingston Line and extending from thence to the river.*

*The first part is entirely agricultural land and at present there is no prospect of its being developed for building purposes. The second part is proposed to be sewered by means of pipes which are collected at a point a short distance south of the Teddington railway station where the sewer will pass under the railway and be carried on to the corner of Cromwell and Fairfax Roads. At this spot the sewage will be lifted to a height of 14 feet by means of Shone's Ejectors and will be discharged into a high-level sewer which will convey the sewage by gravitation into the works. All the sewers are laid at what are known as self-cleansing gradients and sewage will travel from the furthest point in the system to the works in 1 hour 22 minutes. At the commencement or top end of each principal sewer, an automatic flushing apparatus will be provided.*



As first built, the treatment works was designed to cope with a population of 10,000 but the site would allow expansion of the works to handle 30,000 - the maximum capacity of the sewer network.

The total estimated cost of the scheme was £42,000 including the purchase of the land.

The Local Board applied to the Local Government Board (LGB) for permission to borrow this sum and, following a Public Inquiry, were given almost immediate permission to borrow the sum needed to purchase the land but had to wait until January 1889 before they got full approval. The scheme had been split into two main contracts: the first covered the sewer network whilst the second covered the construction of the sewage disposal works. In the event a contract was negotiated with Messrs. Holmes and King of Canning Town covering both elements. At the last minute the two sides failed to agree on an arbitration process but the difficulty was overcome by leaving the appointment of arbitrators

*to the President for the time being of the Institute of Civil Engineers.*

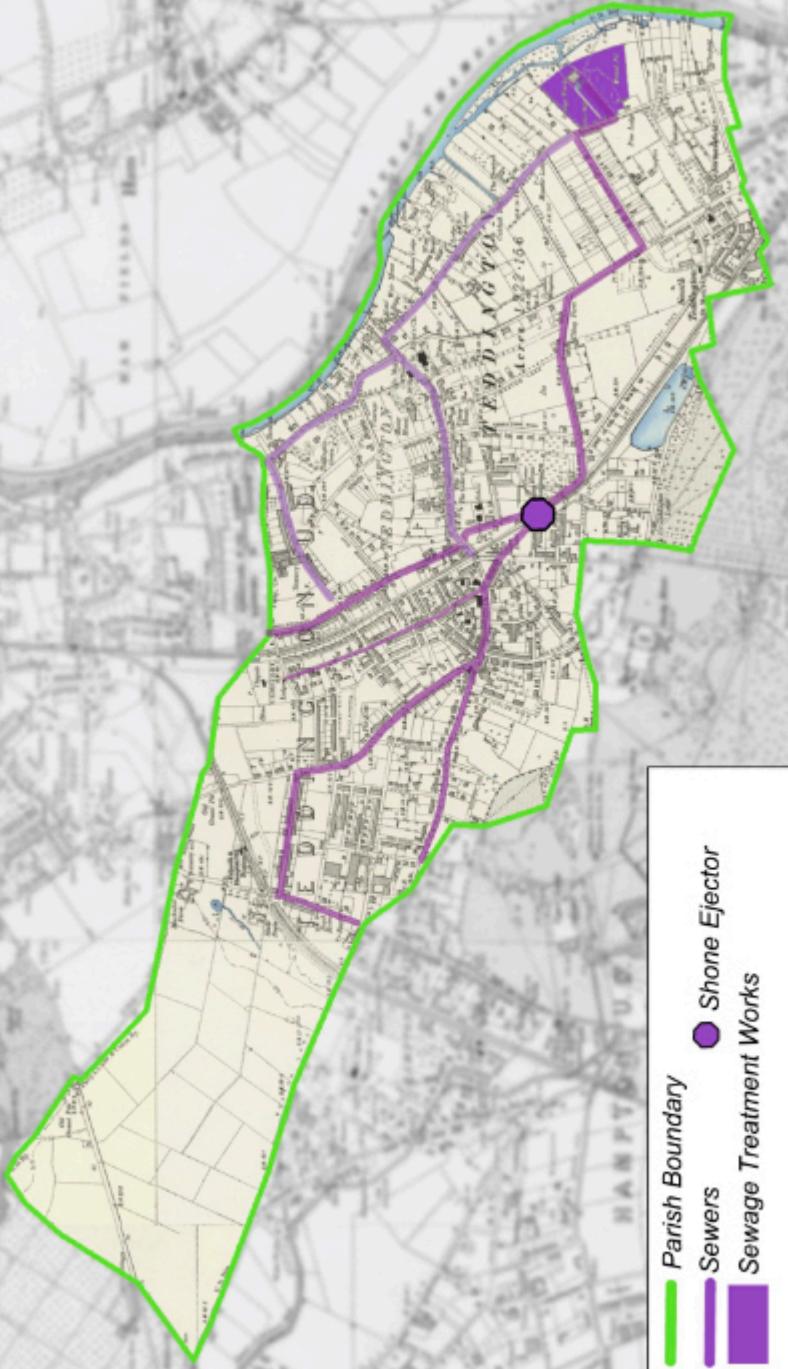
No one involved could have understood the significance this decision would later have.

Work got under way very quickly and good progress continued to be made on the original sewerage scheme during the rest of 1890. The Local Board meeting in February 1891 heard progress reports from the Surveyor and the Consulting Engineer and it appeared the sewers were just six weeks off being finished and Melliss said he had no hesitation in saying that, when finished,

*the Board would have one of the most efficient systems for the disposal of sewage to be found in the Kingdom.*

However, any prospect of impending celebration was soon dashed and it would a further two years before the Board could put its "Kingdom-beating" system into operation.

The main problem was the degree of leakage being experienced. Ground water was finding its way into the sewers through some of the pipe joints to the extent that almost 25% of the total pumping capacity was already being used just to expel the water from the sewer network. To save money, the Board had decided against the use of concrete bedding for the pipes. They now



2.3 Teddington in 1895

refused to release any retention money and urged the Contractors to finish the work (i.e. mend the leaks) without delay. In response, the Contractors insisted that, since they were denied the use of concrete bedding, the leakages were not their responsibility - they had finished their contract and so demanded release of their money.

The stalemate lasted almost a complete year. Finally on legal advice, the Board gave formal notice of their intent to take over the works and it was reported that

*the works were abandoned by the Contractors at 1 o'clock on Saturday afternoon 9 January 1892.*

The situation the Board found themselves in was as unfamiliar to them as it was familiar to their Consulting Engineer. In parallel with his responsibilities to Teddington John Melliss was also Consulting Engineer to the Richmond Joint Sewerage scheme. There too the Contractors had recently abandoned the works, leaving a serious leakage problem unresolved. In Richmond Melliss had found another Contractor to finish the contract and he now recommended the same firm to Teddington. Since the amount of work needed to complete the scheme was unknown, the agreement with the new Contractors was drawn up on the basis of a premium of 10% above prime costs. Work restarted in April 1892 with around 50 men engaged in stopping leaks and preparing for house connections to be made.

But it was not until the Board meeting held on 20 March 1893 that members received a somewhat qualified statement signed by the Consulting Engineer and Surveyor which concluded

*We are of the opinion that no object will be gained by any further delay in permitting the ratepayers to have the full benefit of the sewerage and sewage disposal systems which have been provided and we advise the Board at once to allow house connections to be made and to commence immediately the treatment of the sewage at their disposal works.*

Finally, after two years delay and a cost increase of £7,000, the Teddington Drainage Scheme was ready to be put into operation. However, due to the last-minute arbitration arrangements agreed with the original contractors, the final bill to the ratepayers was destined to be even higher.

The original contract value for the sewers themselves had been £18,275 (£22m today) and this had later increased to £20,338

(£25m) with agreed extras. The Teddington Local Board had already paid £15,811 (£19m) of this sum to Holmes & King but were now being sued by them for a further £13,000 (£16m). In turn the Board were counterclaiming £5,000 (£6m) relating to their costs in having to employ a second Contractor to complete the work. If they lost the case, the Local Board would be facing a cost exactly double the original contract value.

It was announced on 15 February 1893 that the choice as arbitrator had fallen upon John Wolfe Barry, a civil engineer whose single best-known work, Tower Bridge, was about to be completed. After a hearing lasting 31 days, the award was made known on Tuesday 30th January 1894. The announcement consisted purely of the stark facts, there being no requirement for the adjudicator to provide any form of rationale.

As the leader writer in the *Surrey Comet* of February 3rd 1894 stated:

*The award in the Teddington sewerage arbitration is a severe blow for the Local Board of that place, and a very serious thing for the pockets of the unfortunate ratepayers. The award is in favour of the contractors Messrs. Holme and King who are given a sum of £10,720 and their costs both in respect of their claim and of the counterclaim made by the Local Board which is rejected. The only crumb of comfort for the Board and ratepayers is to be found in the fact that the amount of the award is less than the claim of the contractors by about £3,000. The disaster therefore is not quite as bad as it might have been. It is however bad enough and the total cost to the ratepayer of Teddington will hardly be less than £20,000. Such are the disasters which are in store for local authorities, striving to the best of their ability to do their duty on behalf of their constituents and, in the face of great physical difficulties, to provide a perfect system of drainage of their district! Such are the mistakes to which honest judgement is liable, and such the glorious uncertainty of the resort to arbitration – uncertainty as notorious as it is proverbial in the case of law.*

## East and West Molesey - December 1896

East Molesey - along with its riverine neighbours at West Molesey and Hampton - faced extra difficulties in developing their sewerage systems because of the co-existence of five Central London water companies which had hitherto extracted their water from the tidal reaches of the Thames. Under the 1852 *Metropolis Water Act* these companies had been restricted to using intakes located above Teddington Lock and by 1875 all five had moved their intakes above Molesey Lock and built extensive reservoirs on both sides of the river. Not only did this require the drainage schemes to release their effluent well downstream of these intakes and ensure there was absolutely

*East Molesey in 1870 showing the extent of housing development caused by the arrival of Hampton Court station in 1849.*

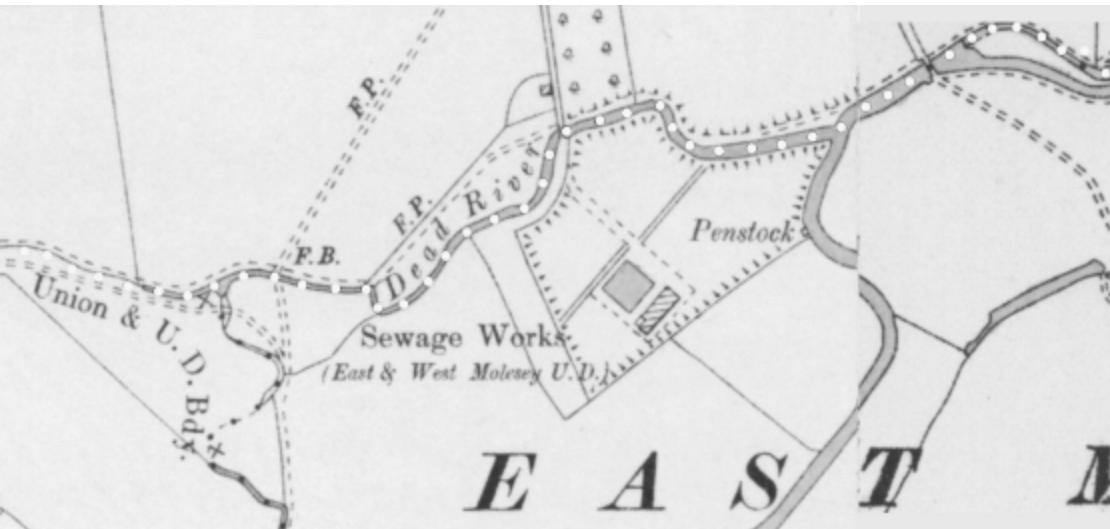


no risk of leakage from the treatment works or settling tanks; it also meant the main streets were already full of large-scale pipes carrying water supplies to Central London and elsewhere so laying a sewer network alongside was an additional challenge.

The arrival in February 1849 of a branch of the London and South West Railway with a station located by Hampton Court Bridge provided East Molesey with a direct link to Central London.

*In an instant the fields and meadows, market gardens and groves, were eligible sites for desirable villas, and local landowners were not slow to recognise the golden potential of the asset on which they sat. The most successful of these was a Hampton lawyer and property developer named Francis Jackson Kent who, even before the railway line was opened, visualised the enormous possibilities for profit the land possessed ... by the end of 1850 he was the owner of (almost) all the land bounded by the river Thames, Hurst Lane, Walton Road, and Bridge Road ... In all this comprised some 300 acres, for which he paid something like £60 to £80 an acre. Kent immediately set about laying down roads across*

*To appease their neighbours in West Molesey, the revised scheme had relocated the treatment works safely within the East Molesey boundary although by the time the scheme was completed, the two communities were part of the same Urban District Council*



*the estate, which was eponymously named Kent Town — a name which even the Ordnance Survey adopted. Building plots were offered for sale along the roads, some of which realised over £4,000 an acre — quite an appreciation over his initial outlay.*

*Quote from The Book of Molesey by Rowland G. M. Baker, 1986*

The population of East Molesey rose from 761 in 1851 to 4,666 by 1891. Meanwhile West Molesey with its population of 480 in 1851 (rising to 780 by 1891) was - and remained - largely agricultural. From 1875, the public health of West Molesey was the responsibility of the Kingston Rural Sanitary Authority until the village was subsumed into the East and West Molesey Urban District Council in 1896.

East Molesey itself had already featured in the drainage history of the Lower Thames Valley when, in 1879, the Joint Sewerage Board acquired options on 700 acres of land to the south west of the town on which they proposed to establish a sewage farm to process the human waste from a total population of 110,000 souls. Not for the first time the unacceptability of receiving sewage from outside one's own local community (otherwise known as "filth") emerged and this unshakeable and widespread prejudice contributed to the ultimate failure of the Joint Sewerage Board.

The responsibility for devising a drainage scheme for their community therefore reverted back to the East Molesey Local Board following the demise of the LTVMSB in August 1885 but there seemed to be little appetite for action. In his annual review of East Molesey affairs for 1888, the *Surrey Comet* reporter (who would have observed the operations of the Board throughout the year) was moved to remark

*The drainage committee assert that they have been taking preliminary steps in the matter but they have refused even to take the members of the Board into that confidence, and the ratepayers are hopelessly in the dark on the subject. The Thames Conservators have repeatedly stirred up the Board ... and at least one member of the Drainage Committee has confessed his ignorance on what was being done.*

Eventually, and with John Charles Melliss appointed as their Consultant Engineer, the Drainage Committee presented their plans to a Special Meeting of the Board held in August 1889. The Committee had assumed that West Molesey would be

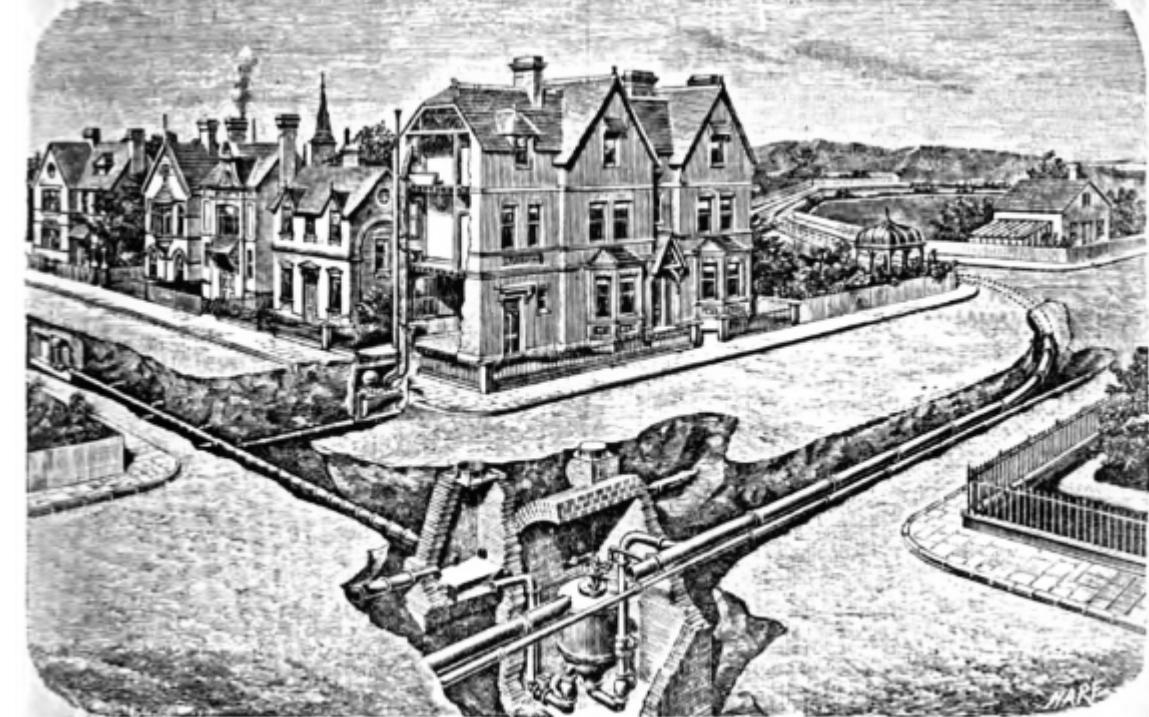
willing participants in the venture although they claimed they were unable to find a way to test this assumption. Worse, they proposed to site the treatment works on the north bank of Dead River - which meant it was actually within West Molesey. Immediate opposition appeared from that quarter - energetically led by its Vicar. It was therefore no surprise that, when the Public Inquiry was conducted by the Local Government Board Inspector in February 1890 he heard from a large number of opposers and he ultimately recommended rejection of the scheme.

A revised plan was ready by mid-1891. Compared with the February 1890 scheme, the costs had gone up from £19K to £27K. The site had been moved to the south east of the Dead River (i.e. within East Molesey). Another LGB Public Inquiry was held in July 1891, during which the Board committed that the effluent would be piped in a cast iron pipe across to the River Ember rather than using the Dead River and the Mole as previously. This, plus the undertaking to create an embankment round the whole site, caused the Lambeth Water Company to withdraw their objections during the Inquiry.

For some undetermined reason the Board had to wait almost 12 months to receive the required LGB sanction to borrow the funds but even then there seemed to be no urgency to get started. In his 1892 annual review of East Molesey the *Surrey Comet* reporter remarked

*The Local Board never had a busier year ... but candour compels us to say that its deliberations have not always been businesslike, and it has attained an unenviable notoriety for its dilatoriness in carrying out the sewerage works to which it has so long been pledged. About six months have elapsed since the final consent of the Local Government Board was obtained to the scheme, and sanction given to borrow the money, but so far not a sod has been turned, and to all appearances there is no immediate prospect of a commencement being made.*

Finally in April 1893 the Board instructed their consultant engineer Melliss to complete plans and get tenders for the work. The Contract was awarded to Messrs Cooke and Co of Phoenix Works, Battersea in June and by December there were 210 workers employed and sewerage of 15 roads was already completed. By February 1894 the workforce had increased to 270 and the following month it was reported that 38,000 feet of



*Shone Ejectors raised the sewage between the two sewer levels.*

sewers had been completed (over seven miles). The network was built at two different levels and Melliss had specified the use of Shone Ejectors to lift the sewage from the lower to the upper levels.

The outfall site was purchased in June 1894 but by October the machinery was still not on order as the committee believed the costs to be excessive. By December, 21 tenders had been received for the machinery and the lowest - for £3,985 - had been accepted. By September 1895 it was reported that the works were rapidly approaching completion and by the following April 335 connections to the sewers had been made (out of 380 with approved plans). In December 1896 John Melliss certified that the works had been completed and the Board took possession of the works.

## Hampton - October 1899

Hampton Parish lies on the banks of the Thames, which forms its southern and western boundaries and divides it from the neighbouring county of Surrey. It is a low-lying district of just over 2,000 acres with soil that is light and gravelly. The Ordnance Survey map of the 1860s shows the majority of the population were living on or near the central triangle of roads, there were outlying groups of houses around Hampton Court Green and New Hampton (now Hampton Hill) near the northern boundary with Teddington. The map also showed that almost 40 per cent of the total area was occupied either by land belonging to the Crown, or to the central London water companies who had their intakes and works at Hampton.

On 9 March 1865 a public meeting was convened by the churchwardens to discuss the formation of a Local Board. The meeting started in the Vestry, but so many parishioners wished to attend that a move had to be made to the School Room. Unlike their neighbours in Hampton Wick and Teddington, the Hampton public were lukewarm to the idea and eventually a public poll was held where the result was declared to be: for adoption, 128; against, 254. On the announcement of the result there was tremendous cheering and placards were issued proclaiming "Glorious Victory". Considerable bitterness was created in the parish.

Having firmly set its compass in 1865, Hampton steered clear of a Local Board until 1890, despite the complaints about the state of the roads, lack of proper drainage, contamination of wells by sewage, and so on. In September 1867 the Thames Conservancy served notice to all riparian local authorities in the lower Thames Valley that any communication between drains and the river must cease within 13 months. The response of the Hampton Vestry was simply to order that anyone to whom this notice applied should desist.

With the coming into force of the *Public Health Act 1875* Hampton became subject to the Kingston Rural Sanitary Authority. The area covered by the new authority was based on the jurisdiction of the Kingston Board of Guardians [of the Poor] and its brief was to administer the provisions of the Act in any community which had not yet formed its own local board of health under the *Local Government Act 1858* (or similar). Thus Hampton found itself in company with the

parishes of Southborough, Tolworth, Hook, Thames Ditton, Long Ditton, West Molesey and Esher all of whom were on the opposite (Surrey) side of the river.

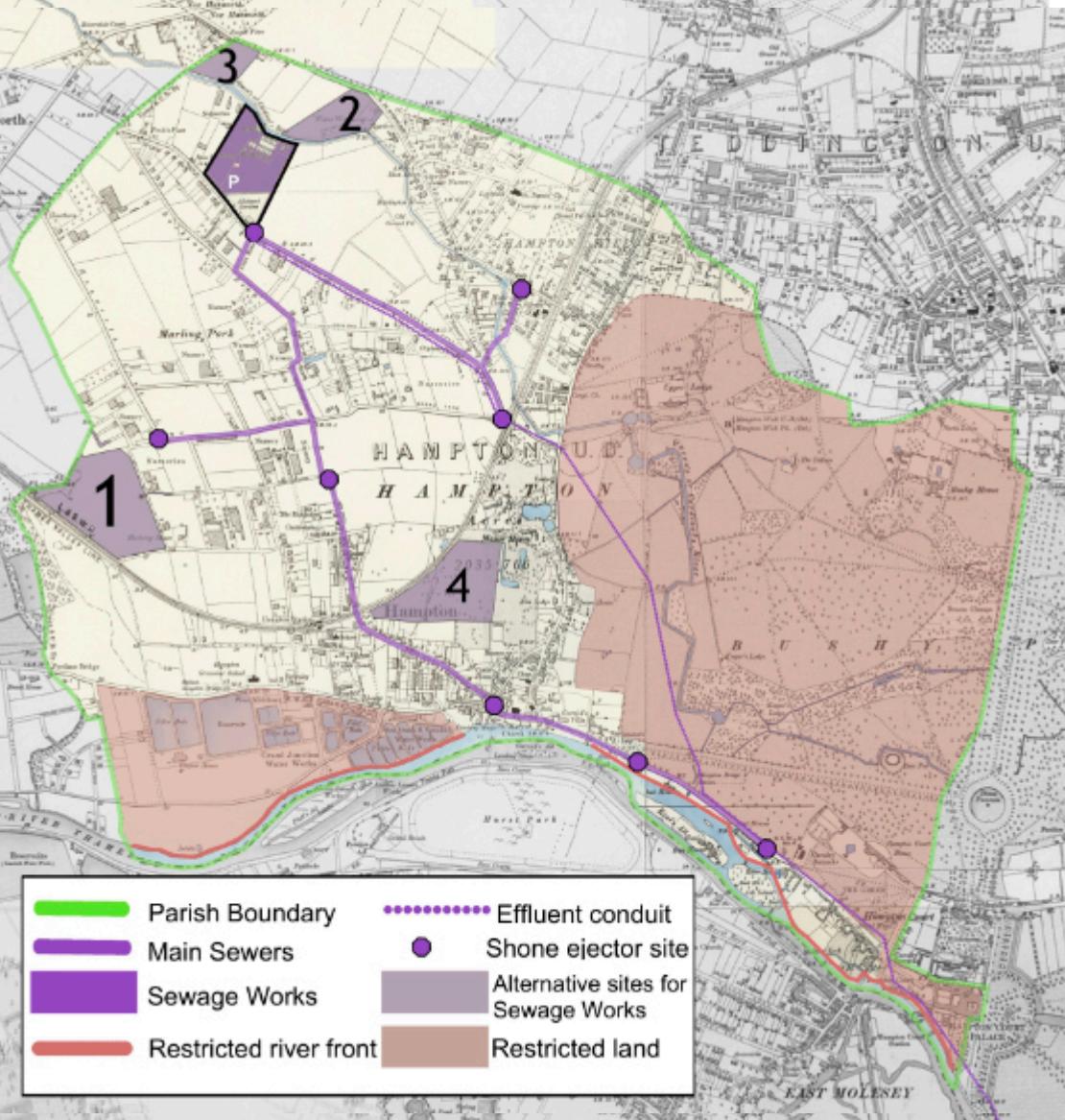
At the Public Inquiry held in February 1877 to review Hampton Wick's proposal for the formation of a single joint authority to deal with the sewage of the whole of the Lower Thames Valley, the Vicar of Hampton firmly told the Inquiry:

*[The parish] does not require a system of drainage at present; the neighbourhood is a very healthy one, and the cesspool system works very well.*

Nevertheless the proposal for a joint scheme won the day and in May 1877 the Kingston Rural Sanitary Authority's responsibility for drainage - together with that of ten other authorities - was subsumed into the new Lower Thames Valley Main Sewerage District. When that body became so unpopular that it was finally dissolved in July 1885, Kingston Rural Sanitary Authority reassumed responsibility for the drainage of the parishes in their jurisdiction, including Hampton. At their January 1886 meeting the various parishes in the district were asked to report their views on how best to resolve their sewage treatment. Hampton argued that, because of the presence of the intervening River Thames, they should not be joined to any other parish and they were subsequently set up as a Special Drainage District, constituting them as a tax raising body able to finance for their own works. In December 1888 they went as far as instructing the ubiquitous John Charles Melliss to prepare a scheme for them based on a site in the southwest of the parish but their minds were elsewhere.

In March 1887, Hampton Vestry had voted to revisit their 1865 decision on forming a Local Board but no further progress had been made. The *Local Government Act 1888* brought the Middlesex County Council into being and this opened up the prospect of success for Hampton at last. At the request of a group of parishioners, the Middlesex County Council held a formal Inquiry into Hampton's need for local government and agreed to the formation of the Hampton Local Board. It held its first meeting on 7 August 1890, more than twenty-five years after the original vote against local autonomy.

The early years of the new Board were focused on establishing itself and catching up on those areas most neglected by the previous administration. An eligible site has been secured for a



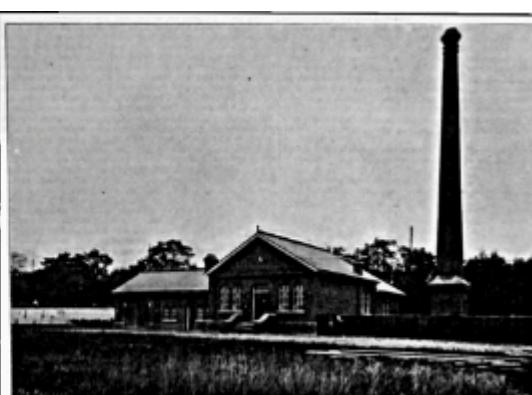
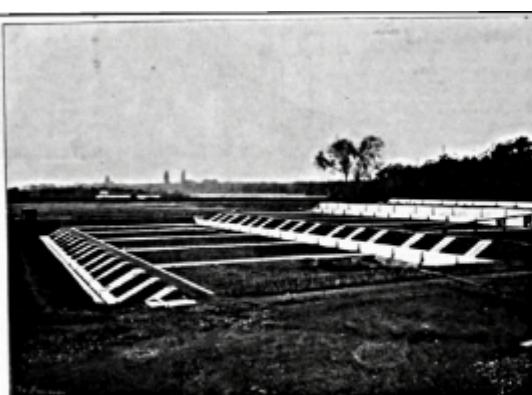
*Hampton Sewerage Scheme 1896 - 1899 showing the route taken by mains sewer network from its furthest point at Hampton Court Palace to the Disposal Works (marked P) at Dean Road together with the course of the return effluent conduit. The positions of the eight Shone Ejectors used to lift the sewage at intervals on its transit to the works are also shown along with some of the alternative sites considered for the sewage works. No. 1 is the original location chosen in 1889 which was later successfully challenged by the three Hampton-based London Water Companies, No. 2 was the Ringwood site owned by William Austin, No. 3 was considered too small whilst No. 4 was the surprise counter-suggestion put forward by desperate opponents of the chosen site.*

sewage disposal works at a cost of £2,000 but it was not until April 1893 that the Board's Surveyor had completed his plans for the long-awaited drainage scheme and a request sent to the Local Government Board for permission to borrow the £38,000 required to implement it. The scheme they had put forward was essentially a rework of that originally produced by Melliss in 1889 with its sewage disposal works site located on the Sunbury boundary. This proved to be the scheme's fatal flaw since the Board had failed to notice that the neighbouring site had since been purchased by the Grand Junction Water Company.

There would surely have been few members of the Hampton Local Board who entertained much hope that their scheme would prevail and in mid-July their worst fears were confirmed by the Local Government Board.

In October 1893 the Board settled on a new 20 acre site in the extreme north west of the parish close to its borders with Hanworth and Teddington. The price agreed was £3,000 and although the acreage was more than necessary for the Board's immediate requirement, there would be plenty of room for future expansion. The site was bounded on the north by the Longford River and on the south by Hanworth Road, with nursery grounds on the west and the playing fields of Hampton Grammar School to the east.

With the site agreed, the Hampton surveyor next wrote to the Engineers of the three London water companies to get their reaction to the proposed site. Whilst the engineer of the Grand Junction Water Works Company stated that he did not anticipate any problem, the other two companies were not as helpful and merely reserved their positions. The surveyor also approached the Office of Works, the Central Government agency responsible for the maintenance of Hampton Court Palace. In this he was aided by various Board members and especially by Auguste de Wette, a wealthy Swiss banker who lived in Hampton Court House just across The Green from the palace. De Wette was both urbane and well-connected and thus fully qualified to handle the delicate negotiations needed. The Office of Works were prepared to allow pipes to be laid through the edge of Bushy Park to avoid the congestion of the water companies' pipes which already lay under all the major roads in Hampton. They were also willing to allow the effluent pipe to run through both parks but were anxious to position the outfall far away from the palace itself.



Hampton Sewage Treatment Works

Above: these two images from *The Engineer* magazine of 20 October 1899 illustrate the most significant features of the Hampton scheme: the 5 x 3 matrix of aerated bacteria contact tanks which, using the Dibdin method, transformed raw sewage into a colourless, odourless liquid in three steps and the Compressor Station which supplied compressed air at 30lbs per sq. in. to the eight (x2) Shone Ejectors.

Left: The works in 1978 shortly before demolition having ceased operation in 1940 when replaced by the Mogden Treatment Works.

The change in location for the disposal works had a major effect on the scale - and therefore cost - of the sewerage scheme. The new site was both higher and more remote than the previously-chosen area resulting in more equipment and pipes being needed to lift and transport the sewage to the works. The scheme was to use Shone Ejectors and the Board appointed its inventor Issac Shone as their Consulting Engineer. Two and a half miles of extra sewers were required and the effluent pipe connecting the works with the river Thames Ditton was now over three miles long. The Surveyor completed his revised plans and estimates which he presented to the Board at their meeting on 9 October 1894. The Board accepted the proposals and applied to the Local Government Board for permission to borrow the £54,980 7s 6d required.

The Public Inquiry opened on 12 December 1894 and was conducted by Rienzi Giesman Walton a Local Government Board Inspector with considerable engineering experience in India including a complete scheme for the sewerage of the City of Bombay. The proposal was to divide the district into eight divisions, each of which would be supplied with an ejector

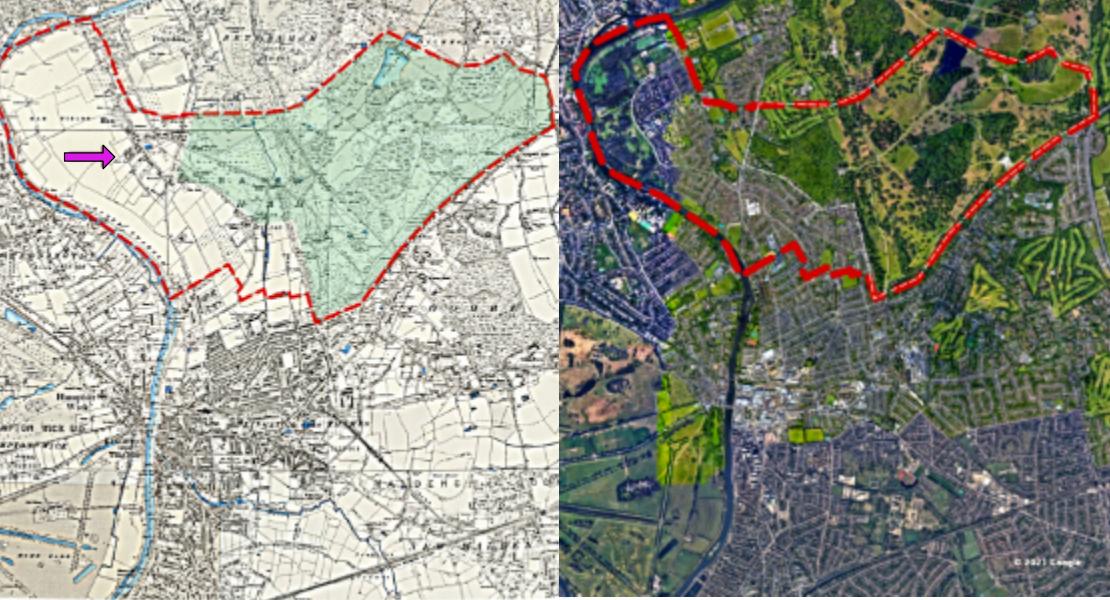


station, where there would be two of Shone's ejectors, which would propel the sewage to the disposal works by the force of compressed air. Having reached the works the raw sewage would be treated with chemicals which assisted precipitation and also acted as deodorizer. It would then flow into tanks where the solid part is allowed to subside. Then by means of a floating arm the liquid part would run off onto filter beds composed of sand, gravel and broken stone. By the time the sewage got to the land it was practically pure water. But it was then subjected to further treatment on the land (as required by the Local Government Board), before being passed along a conduit over three miles long to the river. It would come out below Hampton Court, a long way downstream of the intakes of the water companies.

In a letter dated 12 March 1895 the Local Government Board sanctioned the first of the requested loans in order that the purchase of the land could go ahead.

With the drainage scheme now approved, the Hampton Urban District Council made two strategic decisions intended to avoid problems experienced by their neighbours in Teddington. Firstly they decided that the whole of the construction (with the exception of the supply and installation of machinery) would be carried out by the Council's own workforce rather than contractors. Secondly they agreed to implement a complete surface water drainage scheme in conjunction with the construction of the sewers.

Work was commenced on 9 March 1896 and the first house was connected on 8 December 1898. The formal opening of the sewage works took place on Saturday 14 October 1899.



*Above: Ham in 1895 (l) and today (r). The Royal hunting parks of Richmond A and Hampton Court B are unchanged and much of the area of Ham Fields bordering the river remain largely undeveloped. Elsewhere lammas rights have given way to housing estates.*

*Below: Ham House - home of the Earls of Dysart 1626 - 1948  
Photo courtesy of Country Life*



## Ham - end-1899

Ham was the last of the former Joint Board entities to complete their drainage scheme. Arguably theirs was the most challenging task through a combination of factors: with a population of 1,450 and a rateable value of just £5,000, Ham Local Board had an annual income of just £3.45 per capita. Even Hampton Wick - the next smallest authority at 2,200 inhabitants - received £5.32 per person whilst top of the league Surbiton had a budget of £9.29 per head. Yet at 1,896 acres, Ham was geographically around 50% larger than any neighbouring authority. What is behind these statistical anomalies?

Ham lies between the locations of the former Royal Palaces of Sheen (later renamed Richmond by Henry VII) and Hampton Court (beloved of Henry VIII). To support the royal passion for hunting, both palaces were equipped with their own deer parks. When Richmond Park was enclosed by Charles I in 1637, Ham parish lost the use of most of the affected land, over 800 acres almost half of which was common land. In return for this, a deed was struck which has effectively protected most of the remaining common land, Ham Common, to the present day. The enclosed land, whilst lost to agriculture, remained within Ham's administrative boundaries which explains why its area was so large compared with its population.

Even before the loss of its common land to Charles I, another significant element in Ham's subsequent history had arrived with the completion in 1610 of the magnificent Jacobean mansion known as Ham House. From 1626 it became the family seat of the Earls of Dysart and between 1626 and 1948 (when it was handed over to the National Trust) Ham House had been home to nine generations.

When the community of Ham voted to establish a Local Board in 1864, they appointed the Rev T G P Hough as its chairman. Hough had succeeded his father as vicar of St Andrew's Church on Ham Common but since that church had no vestry, Local Board meetings were held in the New Inn on the north east corner of Ham Common.

In the early 1870s the Dysart dynasty was thrown into a state of flux. William Tollemache, only son and heir apparent to the 8th Earl, had amassed great debts - guaranteed by the expectation of inheriting the family fortune - but in 1872 he pre-deceased his father. The Earl then named his 13-year old grandson, William

John Manners Tollemache, as his heir and appointed three trustees to look after the estate until William reached the age of 40. The Dysart Trustees played a significant role in the affairs of Ham over the next 25 years which as we shall see both aided and hindered the Ham Local Board in their quest for a drainage system for the community.

In the early 1860s Ham had installed a system of sewers designed to collect both sewage and surface water and discharge it into the river but The Thames Navigation Bill of 1866 outlawed the sewage and the system was used for surface water only. With the formation of the Lower Thames Valley Main Sewerage Board, Rev Hough as Chairman of the Local Board became Ham's representative on that body from December 1877 until its demise in June 1885.

Thereafter although their neighbours in Richmond and Kingston were both busily engaged in implementing drainage schemes, Ham seemed content to do nothing. Finally, in 1889, Ham approached Richmond with a request that they be allowed to join their scheme but were told that the vendor of the land for the Richmond treatment works site had made it a condition of sale that it would not be used for treating the sewage of any authorities outside the Richmond Union. Ham Local Board approached the LGB to ask if Richmond could be forced to comply but were told they could not. Shortly afterwards, the Ham Local Board were stung by some correspondence appearing in *The Times* under the headline *Umbrageous Ham*. This was initiated by Mr Hamer, Secretary of The Mansion House Council on the Dwellings of the Poor, who made several references to the unsanitary nature of Ham and accused the Local Board of failing to take any action to correct the situation. The Board refuted the accusations and their medical officer of health had prepared a detailed rebuttal but in the event the Board elected not to go public with their response. To the complete surprise of the Board members at their January 1890 meeting, the Chairman suddenly announced his resignation after 26 years on the Board but in doing so expressed his strongest conviction that:

*the one and only permanent remedy would be found in providing sewerage works for the whole parish. If this was firmly undertaken I do not think it would be either difficult or expensive.*

The furore aroused by the *Umbrageous Ham* correspondence did not go away and in May 1890 Major-General Carey RE, an LGB Inspector, made an official visit on behalf of the Local Government Board to see for himself the sanitary state of the village. In his report, received in early August 1890, Carey recommended

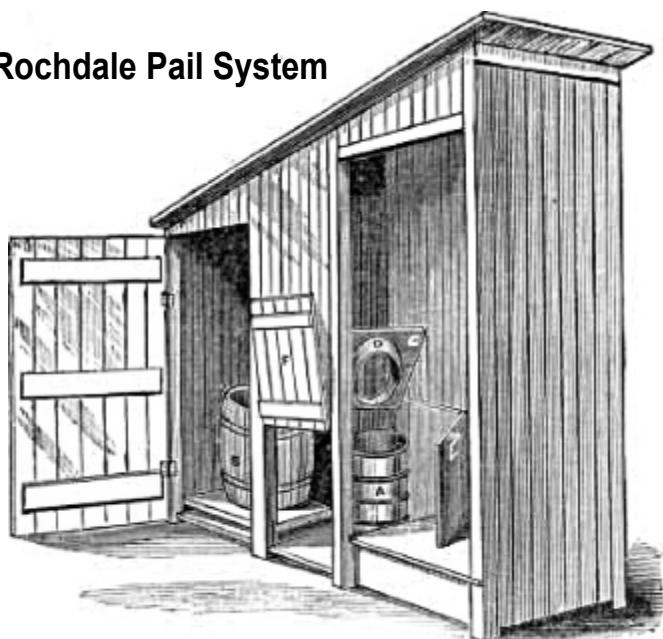
1. *All wells in Ham should immediately be condemned and replaced by the supply from the Southwark and Vauxhall Water Company*
2. *All cess-pits should be abolished and a proper system of drainage - such as that already outlined by Charles Mansergh CE - should immediately be devised and implemented.*

In discussing their response to these recommendations, the Local Board doubted they could enforce the adoption of a piped water supply in cases where the well water had not been condemned. They also refused to be pushed into adopting the outline drainage scheme devised by Charles Mansergh and instead (and eventually) commissioned William Hope, Surveyor to the Kingston Rural Sanitary Authority, to devise three alternate schemes with a range of coverage areas. When the drainage committee finally presented their report to the Board in September 1892 they made the surprising recommendation that not one of the three schemes should be adopted - mainly on the grounds of cost. Instead the committee proposed the adoption of the Rochdale Pail system as used in nearby Leatherhead (see the box on the next page).

It is not clear the extent to which the pail system was adopted in Ham but it was not until early 1895 that the drainage question reappeared on the now-Urban District Council of Ham's agenda. Colonel Seddon RE was commissioned to devise a scheme which was presented by the drainage committee to full Board in July. It was adopted not least because its estimated cost was just £4,500.

The mandatory LGB Public Inquiry for Seddon's scheme was held on 5 November 1895 in the recently-completed Vestry Room of St Andrew's Church with the Council's clerk, a local solicitor, presenting the case. He explained to the Inspector that their new status as a UDC with a larger district and consequently larger rateable value finally gave them the financial resources necessary to implement a comprehensive drainage scheme. He went on to explain that the site for the

## The Rochdale Pail System



*Invented by a Rochdale pharmacist in 1868 the Rochdale Pail System replaced the cess-pit with a small outhouse (privy) which contained a seat, underneath which a portable receptacle was placed. This bucket (pail), into which the user would defecate, was removed and emptied (typically weekly) by the local authority. The contents, known euphemistically as night soil, would either be incinerated or composted into fertiliser. The cost of this service was partially or wholly covered by the rates. Similar systems operated in several northern cities as well as in nearby Leatherhead, on whose experience the Ham drainage committee largely derived their proposal.*

*For authorities such as Ham Local Board with no sewer system to deliver the waste to a treatment works this was certainly a healthier option for their populace than relying on the individual households to keep their cess-pits in proper order.*



treatment works had been agreed with the Dysart Trustees and offered to the Council without charge. However, later in the Inquiry, the barrister representing the Trustees disputed the claim that the site was already agreed and said that neither the location nor the method of sewage treatment met with the Trustees' approval. The LGB Inspector confirmed that, in the absence of an agreed site, no funding approval could be given. In the event it was not until October 1896 that the draft conveyance on the original site was delivered, and February 1898 before tenders had been received and the application for Public Funding could finally be progressed - over two years after the original unsuccessful Public Inquiry.

Once the LGB funding approval was received in June 1898, construction of the scheme progressed very rapidly. The half-mile stretch of sewer along Petersham Road from its junctions with Ham Common and Sandy Lane were completed in just two weeks. The treatment works was ready for house connections to start by January 1899 whilst in Lock Road, the last area to be finished, connections started in July with the whole scheme complete by the turn of the century.



## Modern Times

The *Local Government Act 1888* created a third tier of government which operated between the local boards and central government, able to impose more control and consistency over the former whilst relieving the latter from much of their detailed involvement in local affairs. The new County Councils as they were called consisted of councillors, directly elected by the electorate; and county aldermen, chosen by the council itself. With their greater numbers and closer proximity to their electorate than Members of Parliament, the councillors were much better able to develop policies which balanced the needs of the greater good against the - often selfish - demands of individual communities. This local knowledge also made them ideal partners to Central Government in the implementation of the next stage of local government reform which, in 1896, led to the creation of Urban (and Rural) District Councils to replace the previous Local Boards.

Sewage Treatment became the responsibility of the new County Councils but when they came into power in April 1891 most Local Boards were already in the throes of implementing (or had just completed) their local schemes so the new tier authorities had plenty of time to plan and implement their network of sewage treatment works of which the three pictured opposite cover the member authorities of the former Lower Thames Valley Main Sewerage Board.

Mogden Farm was built in 1931-36 by Middlesex County Council replacing 28 small sewage treatment facilities including those at Twickenham, Richmond, Teddington and Hampton. It is the third largest sewage works in the United Kingdom (after the two Central London works) and now treats the waste water from about 1.9 million people North and West London.

The Hogsmill River sewage treatment works, opened in the mid-1960s, is located where the boundaries of Kingston upon Thames, Surbiton and New Malden meet and treats the sewage of those three communities along with Ham and Tolworth/Southborough/Hook.

Esher sewage treatment works are located just north of the original site and treat the sewage of Esher, Thames Ditton and East/West Molesey.

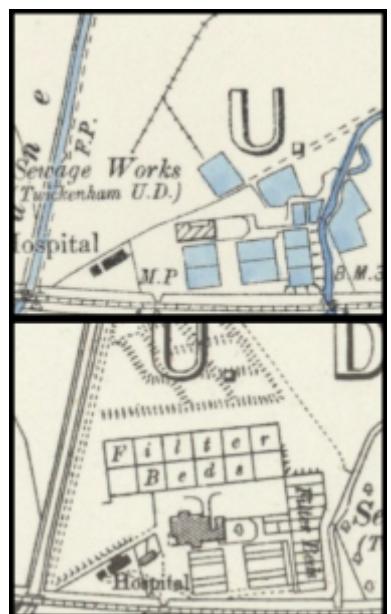
The following pages describe what now occupies the original Victorian sewage scheme sites.

Twickenham January 1880 - mid 1930s

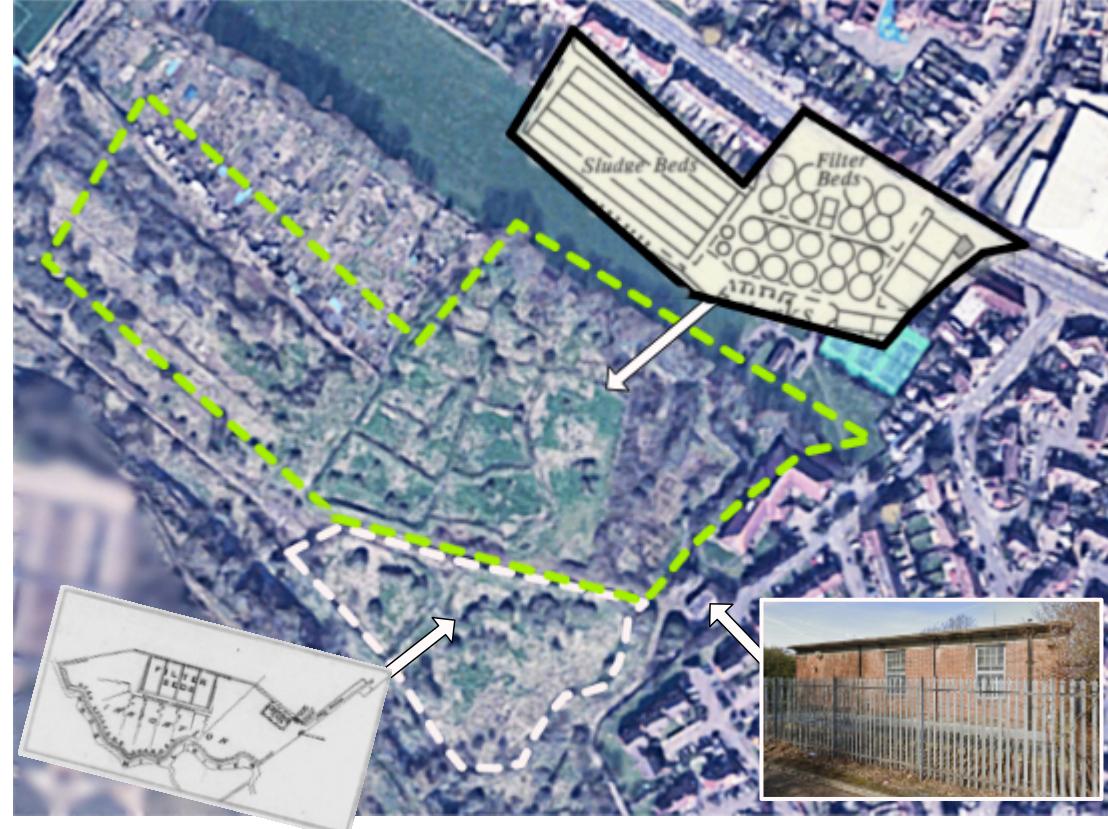


Portions of the original 1878 works, including the boiler house and engine room, were incorporated into the new pumping station which opened in June 1908. However the new boilers were powered not as before by coal but by household refuse which was burnt in two destructors each of which was capable of incinerating two tons of rubbish per hour - sufficient to meet the entire heating requirements of the process.

When the operation moved to Mogden Farm, the Edwardian pumping station was retained and now forms part of Richmond Borough Council's maintenance yard.



New Malden August 1888 - mid 1960s



New Malden was the first authority to complete their sewerage scheme, opening it on just less than two years from the official demise of the LTVMSB. Located in the north east corner of Norbiton Common, the works served The Maldens (New and Old) and Coombe. The original site (white dotted line above) was used until after WW1 but by the 1930s the population had grown to such an extent that a new sewage treatment works was constructed on a much larger site adjacent and to the north (green dotted line). By the mid-1960s both old and new sites were fully developed. With no further capacity available, the operation was transferred to the newly-opened Hogsmill Works which occupies an adjacent site. After all the plant and buildings were removed, the site was allowed to rewild. All that remains on the site is a sewage pumping station at the end of California Road.

**Kingston November 1888 - 1945**

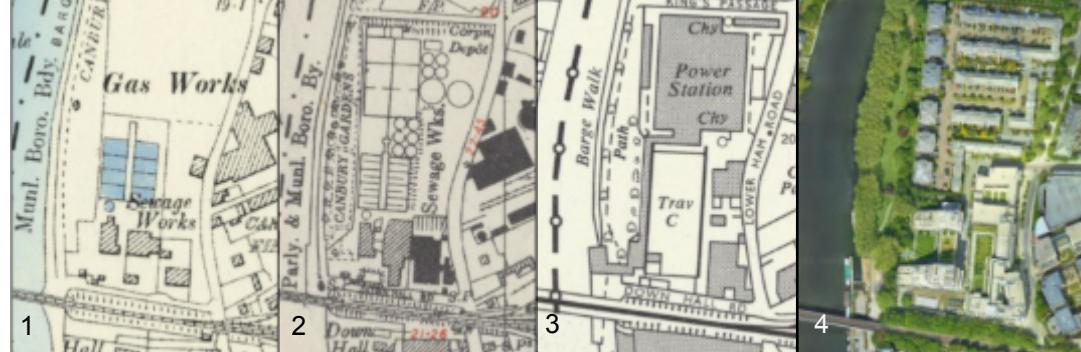
**Surbiton November 1888 - 1908**

**Hampton Wick January 1891 - 1945**



The contract between the Kingston Sewerage consortium and the Native Guano Co (NGC) was negotiated on a rolling ten-year basis but in 1908, after two terms, Kingston Council - perhaps finally reacting to the complaints it received from the public using Canbury Gardens about the stench released each time the sludge-baking oven doors were opened - decided to terminate the contract and take over the operation of the works themselves. To protect their lucrative worldwide fertiliser sales, NGC agreed to purchase the sludge and remove it by barge to a new purpose-built processing plant at Southall. At the same time the Surbiton authorities elected to leave the consortium and set up their own sewage treatment works at Berrylands. The Down Hall site continued operating with regular expansions in the scale and upgrades to the technology used until finally it closed in 1945.

The site had been ear-marked for the new Kingston B electricity



*Above left to right:*

- 1 The original 1888 configuration.
- 2 The final configuration before demolition in 1945.
- 3 Kingston B Power Station in 1968.
- 4 500+ Housing units on the Down Hall Site today.

power station for which planning had started just prior to the Second World War. Construction work began following the end of hostilities and the new station was finally officially opened by His Majesty George VI on 27 October 1948. Output reached its peak in 1962 but then fell steadily to just 10% of its capacity by 1975 as nuclear-generated supply was meeting demands and the Down Hall station was effectively moth-balled with only occasional test start-ups to check the continuing viability of the plant. Generation finally ceased in October 1980 and following demolition of the power station in the mid-1990s, the site was returned to Kingston Council.

Redevelopment took place in two stages. The first involved the north end of the site where the power station itself had been located. 170 housing units - flats and townhouses - were erected but only after an army of 150 security staff had finally succeeded in ousting a large group of well entrenched eco-warriors protesting at the destruction of a line of poplar trees erected to screen the building.

The second stage, which involved redeveloping the southern end of the site which had housed the coal-yard, was delayed more than three years to allow the Electricity Company sufficient time to relocate their transformers at a cost of £6.5m - paid for by the developer who then erected a 150 bedroom hotel and 137 flats at the east of the site followed by the erection of a part 16-, part 11-, part 6-storey building comprising 222 flats, on the western part of the site (i.e. the riverside).

A total of 529 housing units now occupy a 13.5 acre site (equivalent to 7 football pitches) which just over 20 years ago had ... none.

## Surbiton

1888 - 1908 Down Hall  
1908 - 1965 Berrylands

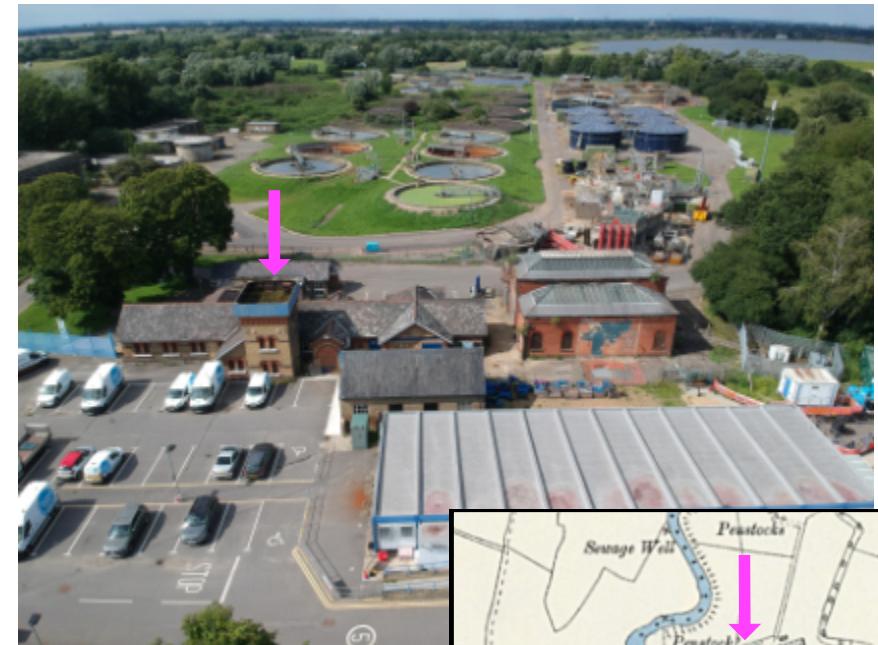


When Surbiton opted out of the Kingston Down Hall scheme in 1908, they built their own sewage treatment works north of the railway line near Berrylands station. These served the needs of the borough until the new Hogsmill STW opened in the mid-1960s and took over the operations of the Berrylands works.

Whereas many such disused sites have quickly been redeveloped to provide new housing schemes - notably at Tolworth, Richmond and Kingston - the proximity of the new Thames Water Hogsmill STW operation mitigated against such redevelopment. Instead a refreshingly different approach was adopted at Berrylands where the plant had been left as it was when operations ceased and the whole site allowed to rewild. The eastern end had become a lake ("Surbiton Lagoon") and the filter beds gradually became masked by trees. The process received a significant boost in 2007 when, in return for permission to enlarge the capacity of the treatment works, Thames Water undertook to enhance the wildlife of the non-operational areas and provide opportunities for community involvement, including educational visits for schools.

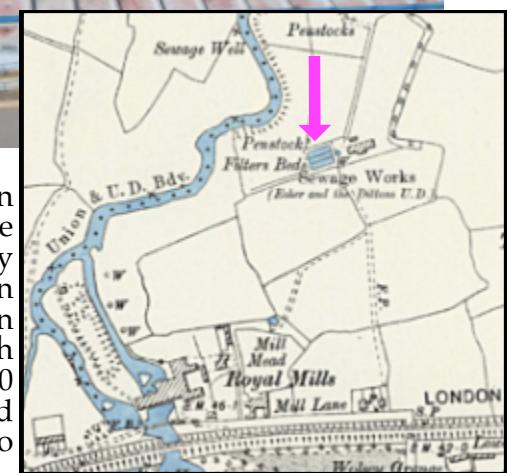
## Esher and Thames Ditton

1890 to current times

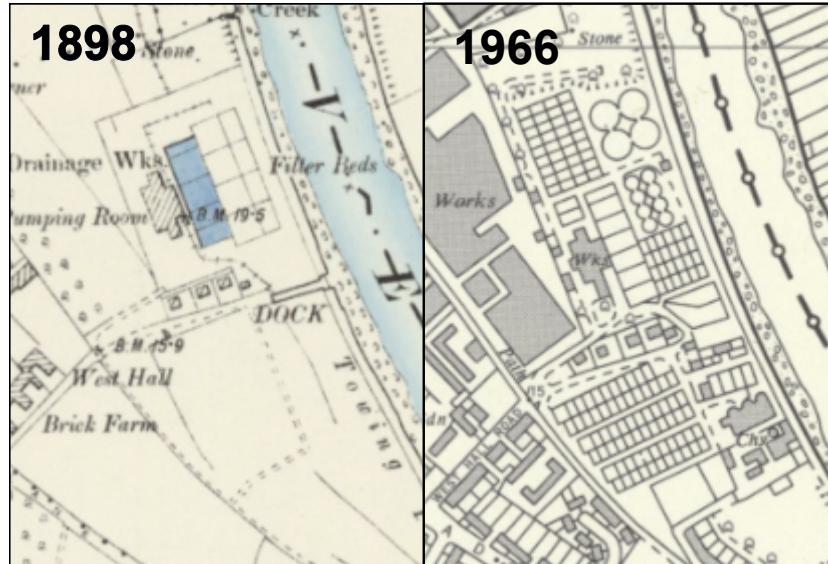


The Esher and Thames Ditton works were the first of the Kingston Rural Sanitary Authority's projects to open and the only one still to remain in operation - albeit much enlarged. The original 1890 building is shown arrowed and by 1912 the whole complex to the east of it was in operation.

Surrey County Council chose the Esher site as the location for the consolidation of many Victorian era works - including not only Esher itself but also East and West Molesey - as they reached the end of their operational life.



**Richmond upon Thames September 1891 to c2000**



The two maps (above) show the growth in the original Richmond sewage works over a 70-year period but the huge advances made in sewage treatment technology during the twentieth century allowed the Richmond sewage to be treated in much smaller plant (shown arrowed in the photo below) whilst the original site now accommodates more than 400 residential properties.

**Southborough, Tolworth and Hook end-1891 to 1930**



Not only was the Southborough, Tolworth and Hook sewage treatment works the least-costly of all the schemes covered in this book, it was also the shortest-lived. The 1896 reforms of the lowest level of government saw the formation of Urban District Councils and the abolition of Rural Sanitary Authorities. The Tolworth works now came under the control of Surbiton UDC and, when the latter authority ended its joint agreement with Kingston in 1908 and constructed its own treatment works at Berrylands, it was obvious that in time this would replace the Tolworth facility. As the map (above right) shows, by 1932 the site had been redeveloped and was now covered by an extensive housing estate.



## Teddington March 1893 to 1938

In operation for only around 45 years, only the works at Tolworth and Hampton had a shorter working life than the Teddington Sewage Works. The Teddington Local Board already owned the southern part of the site complete with its gravel pits and later managed to acquire the northern half on which it chose to locate the works.

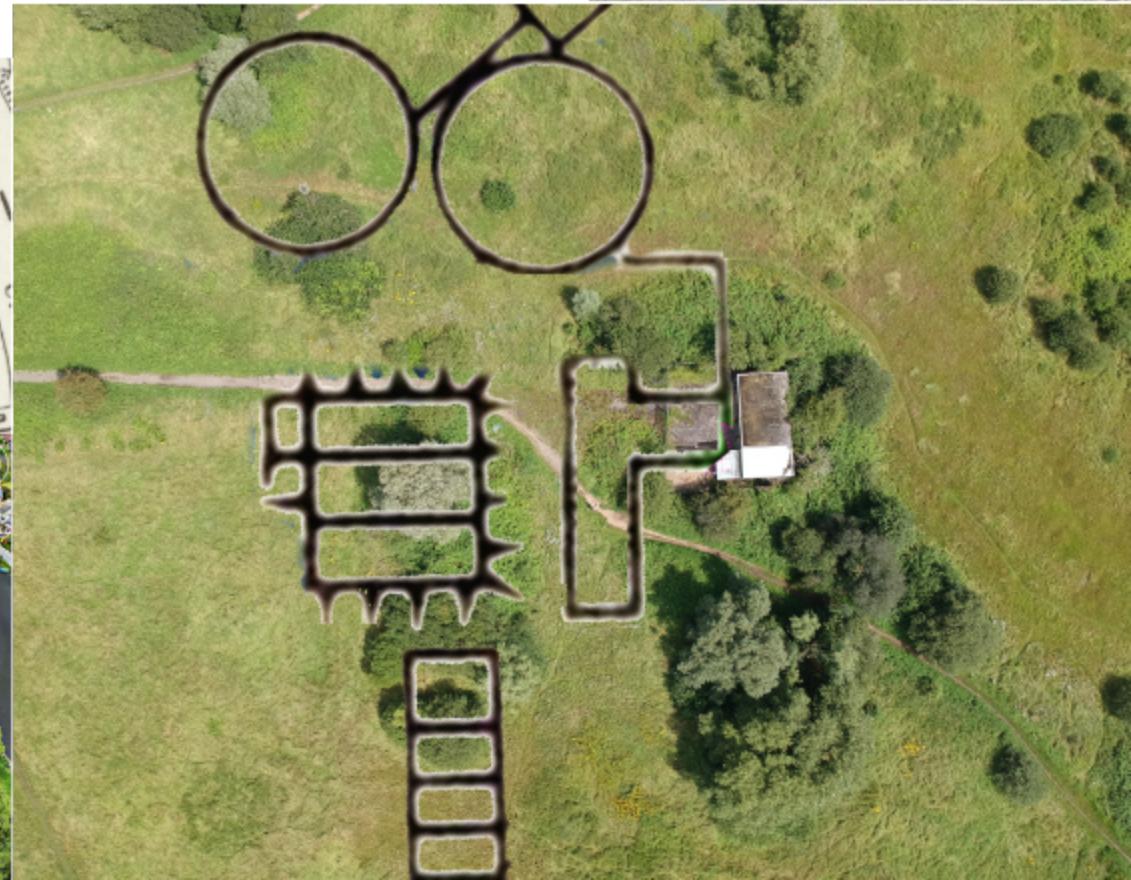
After it closed in 1938, the works site was acquired by Middlesex County Council (London Borough of Richmond upon Thames from 1965) as part of a far-sighted plan to locate secondary, junior and infants schools within walking distance of each other. Teddington Boys' School opened in 1962, later becoming Teddington School on the admission of girls in 1985. A new school building, exactly on the site of the original pump-house was opened in 2014.

Meanwhile, by the 1950s and with the quarries now filled with household refuse and road scrapings, the Broom Road Recreation Ground was established complete with tennis courts and a children's playground.



## East and West Molesey April 1896 to c1950

There is almost no trace of the original works on Molesey Heath where once a complex of filter beds, settling tanks and sludge tanks treated the waste from a population that had grown to 7,000 by the time the operation was transferred to the newly-expanded and updated Esher sewage treatment works 1.5 miles due south. Located on the site of the original pump-house, a nondescript, and now heavily graffiti-covered building - even though it is located behind an apparently impenetrable fence - now houses the electric pumps which transfer the waste of a population exceeding 50,000 to the Esher works.



## Hampton October 1899 to 1940

Sewage treatment ceased to be carried out at Hampton at the beginning of WW2 and the waste was instead pumped to - and processed at - Mogden Farm the new Middlesex County Council treatment works 2.5 miles away. However the building housing the (now diesel-powered) air pumps for the network of eight Shone Ejectors remained in place until the latter were replaced by electric motors housed within each ejector chamber. Following demolition of the main buildings during the 1970s, the site now houses low quality pre-fab style properties in contrast to the more conventional housing of the surrounding streets.



## Ham December end-1899 to c1955

In the north-east corner of the Meadlands Primary School playing field is a building that houses the electric pumps that now deliver the waste from the former Ham UDC works to the Hogsmill Sewage Treatment Works in Surbiton. The building is located at the end of the lane that runs past the Lock Road Surgery and, apart from the discrete Thames Water sign on the gate, gives no other hint of the complex of tanks, filter beds and pump-house that once used to cover the whole field.





Above: the moment of impact. An estimated 640 lives were lost.

Below: retrieving bodies from the collision site. Watermen were paid 5s (around £25) for each corpse retrieved.



## Epilogue

On the evening of Tuesday 3 September 1878, the *Princess Alice* paddle steamer with capacity for over 900 passengers was making her way up the Thames on her return journey from Sheerness to the Swan Pier next to London Bridge.

The weather had been fine and her passengers had enjoyed a day's pleasure trip to the Kent coast. Some children were asleep, the band was playing on the main deck and, near the paddle box, a couple were arguing.

Some time around 7.30pm the *Princess Alice* entered Gallions Reach on the approach to Woolwich, when the passengers saw a large collier, the *Bywell Castle*, bearing down on them. The vessels collided and the *Princess Alice* was struck on the starboard side just in front of the paddle box; she split in two and sank within four minutes—her boilers separating from the structure as it went down. There was no record of the actual number of passengers on board at the time but around 640 bodies were eventually recovered both from the river and from inside the wreck itself making the sinking of the *Princess Alice* the worst inland disaster on water in the UK.

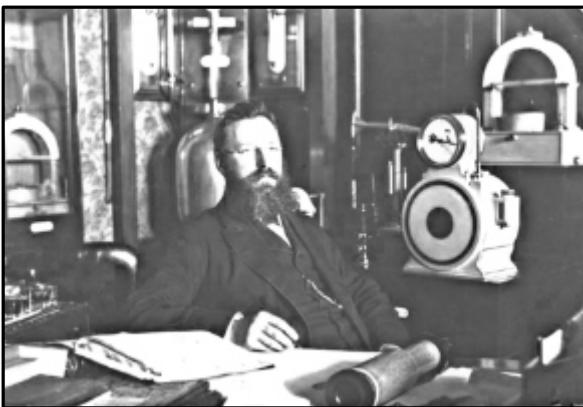
What made the situation even worse was the fact that the *Princess Alice* sank at the point where Central London's two sewage pumping stations were sited. The twice-daily release of 75 million imperial gallons of raw sewage from the sewer outfalls - Abbey Mills at Barking on the north bank, and the Crossness Pumping Station on the south - had occurred just one hour before the collision. After the dead were later recovered by watermen, it was claimed that many had in fact not drowned, but instead had died from ingesting the poisoned waters of the toxic sludge-filled river.

This claim caught the public's imagination and whilst this put pressure on the Metropolitan Board of Works to clean up their act, it does not appear that any further action was taken until, in 1882, the City of London complained that the discharge of the sewage was a nuisance and danger to health. In response, a Royal Commission was set up under Lord Bramwell to look into the City's complaint. Again there was no discernible outcome and throughout his employment at the Metropolitan Board of Works Bazalgette's great engineering scheme remained mainly as one for sewage diversion with little or no attempt to treat the liquid part of the effluent before releasing it into the Thames from the Abbey Mills and Crossness outfalls.

However from 1888 the solid element (known as sludge) was

separated from the liquid and a fleet of six sludge boats was commissioned by the Metropolitan Board of Works to transport the sludge downstream before releasing it. Each discharge was spread evenly along a 10-mile stretch of the Barrow Deep downstream from the Nore lightship. The sludge would provide nutrients for the copious stocks of fish in these important fishing grounds and this practice continued unchanged until 1998.

When the London County Council succeeded the Metropolitan Board of Works in 1889 the first Chairman of the Main Drainage Committee appointed by the Council took a keen personal interest in developing and implementing plans for purifying the liquid effluent before its release from the outfalls. Under the management of William Dibdin (below) who had, at the age of 39,



just been appointed the LCC's Chief Chemist, experiments were conducted in 1892 on the use of "contact beds" made from clinker. The technique was based on the principle that organic matter in the crude sewage would be caught in the interstices between the particles of the clinker where aerobic organisms would literally feed on the trapped matter leaving the resultant liquid pure enough for safe discharge directly into the river. Once the basic technique had been proven to be effective, it was refined by employing two or three sets of contact beds each with progressively finer interstices so as to trap and process the matter and avoid the beds becoming clogged.

The technique was widely adopted and these contact beds - with their familiar slowly rotating sprinkler arms - are still the mainstay of modern sewage treatment facilities worldwide.

Thanks to Dibdin, the Sweet Thames was, once again, made Sweet.