THE SEWERS SERVING THE CITY OF LONDON

Before the area which we now know as London was inhabited, all the water which either fell as rain or came to the surface from springs, drained by nature down rivers and streams to the River Thames — a river which at that time was wider and which flooded naturally over the adjoining low lying lands.

As people began to reside in the area, so the streams running into the Thames started to get polluted, as did the Thames itself and although cesspits were constructed, these often overflowed into the streams or were consciously connected into these streams. Thus, as the town grew, the pollution problem increased.

In 1427, a year according to Stow of unseasonal weathering, an Act of Parliament was passed whereby several Commissions of Sewers were set up so that "divers persons" could be sent into all parts of the realm as and when the need arose. This Act was only intended to apply for 10 years but was renewed in 1439 and 1444 and, indeed, similar Acts were passed in 1472, 1487 and 1514. All these Acts were comparatively mild as regards the powers granted to the various Commissions for they could only require land owners to maintain sewers, or the banks of the sewers, and there was no power to insist upon new or improved works.

However, in 1531, a Statute of Sewers was passed the preamble of which reads:—

> "Our Sovereign Lord the King . . . considering the daily great Damages and Losses which have happened in many . . . parts of this his said Realm, as well by the Reason of the outrageous Flowings, Surges and Course, of the Sea, in and upon Marsh-grounds and other low Places heretofore . . . won and made profitable for the great Commonwealth of this Realm; as also by occasion of Land-waters and other outrageous Springs . . . Hath . . . Ordained . . . That Commissions of Sewers . . . shall be directed in all Parts within this Realm, from Time to Time where and when Need shall require . . ."

This Act dispensed with the local Commissions of Sewers formed in and after 1427 and set up 7 or 8 Commissions of Sewers in the London area with much wider powers and its provisions lasted, with only minor modifications, up until the 19th Century. The new Commissions had power to undertake the provision, improvement and maintenance of sewers.

Under the 1531 Act (and subsequent Acts) Commissions were appointed for specific periods (originally for 3 years but later for 5 and 10 years). Sheriffs were required to summon jurors to report on impediments to the free passage of water in streams and sewers (and on damage and disrepair in embankments),

together with the names of owners and occupiers of the lands concerned. The Commissions had the duty either to insist upon necessary works of repair by the relevant owners and occupiers, or to tax them so that such works could be carried out.

The various Commissions in the London area were responsible for some good drainage work but they did not act in co-ordination with the result that levels and sizes of drainage systems were not compatible. Furthermore, as the years went by they were hampered by their antiquated constitutions, and they did not have the powers and flexibility to deal with the new problems which were being experienced. These problems arose out of the effects of an enormous increase in population, with the consequent rise in buildings and, in due course, by the invention of the Water Closet which was being installed in the houses of the richer residents.

It was Sir John Harington, a godson of Queen Elizabeth I, who produced the first Water Closet in this country for it was before 1592 that he installed one in his house at Kelston, near Bath. A second one was installed in Richmond Palace shortly thereafter. Alexander Cummings improved the design in 1775 and was followed by Thomas Prossen in 1777 who used a ball float. In 1778 Joseph Bramah built a highly successful two valve closet and 4 years later John Galtait built his "stink trap" followed by Edward Jones who in 1896 made one of the finest W.C.'s of all (later taken over by Armitage), fashioned in the form of a lion on whose back sat a handsome patterned bowl. Thomas Crapper (1837-1910) patented the valveless water waste preventer and his name has, of course, passed into the colloquial language on both sides of the Atlantic.

It was Crapper who supplied a lavatory emblazoned with the Prince of Wales' feathers, which was apparently allowed after he had received the Royal Warrant for installing drains and sanitary fittings at Sandringham between 1886 and 1909.

Although the introduction of the W.C. was of itself an advance in the hygienic conditions of the residents of the City of London and elsewhere it caused a crisis to the sewerage and sewage treatment systems of the City and other parts of the country.

Serious and increased risks to health, as a result of inadequate drainage systems, rendered new procedures and powers essential; this need as I have intimated was not confined to London as is evidenced by a gravestone at Bilston in Staffordshire which reads:—

> "In memory of Mary Maria wife of Wm Dodds who died Decr 12th AD 1847 aged 27 and of their children Louisa who died Decr 12th 1847 aged 9 months and Alfred who died Jany 3rd AD 1848 aged 2 years and 9 months. All victims to the neglect of sanitary regulations and specifically referred to in a recent lecture on Health in this town".

Thus, in 1847, a Royal Commission, set up to enquire into the requisite means of improving health in the metropolis, concluded that it was essential that the drainage of the Metropolitan Area should come under the umbrella of one efficient body and in 1848 the various London Commissions (apart from that of the City of London which in fact did not have its own separate Commission until after the Great Fire of 1666) were consolidated and became the Metropolitan Commission. The City of London Commission remained in being until 1898 when its powers and duties were transferred by the City of London Sewers Act 1897 to the Court of Common Council but the new Metropolitan Commission could require the City Commission to execute certain works in the City area.

The 1848 Act repealed much of the old cumbersome procedure, but the Metropolitan Commission still lacked the widespread powers which would have been appropriate to replace the whole main drainage system of London — and such replanning was now becoming urgent. In one year alone 20,000 people died of Cholera.

The new Metropolitan Commission promptly insisted upon the removal of all cesspools and the connection of all houses to the main sewers. This dramatically improved conditions far away from the River Thames, but conditions close to the Thames in fact deterioriated still further. The reason for this was that the Thames became, in effect, a large open sewer and when it flooded (particularly when storms coincided with high tides) it needs little imagination to realise the effects on low lying areas.

Whilst therefore the Metropolitan Commission used their best endeavours to create improvement by building some new sewers and improving administrative procedure, not enough could be done quickly enough. Consequently, in 1855, the Metropolis Local Management Act created in 1856 the Metropolitan Board of Works which had the task of, not only maintaining the existing sewers, but also of constructing new works with the primary object of preventing all sewage entering the Thames. Indeed, this latter objective had become of such importance that the new Board of Works was required to complete the task by 1860.

This then set the scene for the commencement of the mammo task of making substantial improvements to the London sewerage system.

On 8th February 1856, the Board of Works passed the following Resolution:—

> "That this Board, impressed by the necessity of at once proceeding with the Works necessary for the complete interception of the sewerage of this Metropolis, request the Chief Engineer to report to the Board, at the earliest possible period as to the Plans necessary for the accomplishment of such object".

The Chief Engineer was Sir Joseph Bazalgette who is regarded as the architect of the present sewerage system of London. He reported to the Board on 3rd April 1856 with plans for the drainage system south of the Thames which he considered even more urgent that improvements on the north side of the river. However, on 2nd May that same year he reported with regard to the north side and the speed with which he acted is not only highly commendable but is an indication of both the importance and the urgency of the task.

As I have said previously, the original sewers and drains serving London ran into the Thames and these naturally ran, almost always so far as the north of the River is concerned, from north to south. Bazalgette now proposed (and he was the first to admit that his proposals were not entirely original) that there should be three intercepting sewers running approximately in a west-east direction.

As the direction implies these sewers were to intercept the flow from entering the Thames although, when it rained, storm water overflows were to operate and the storm water would therefore pass into the Thames.

These interceptors were all designed as gravity sewers at various levels and to avoid construction at excessive depths on the low level interceptor (i.e. the one nearest the Thames which passes through the City of London) pumping stations were to be built. All the interceptors, north of the Thames, were to discharge at Barking, sewerage being stored there for discharge on the ebb tide.

This grand design however met with a period of inaction after the proposals were first presented to the Board in 1856. The proposals were subject, by Statute, to the approval of the First Commissioner of Works, and differences of opinion arose between the Metropolitan Board of Works (which supported Bazalgette) and the advisers of the First Commissioner of Works. These differences were concerned principally with the position of the outfalls (should they be removed further down the Thames Estuary?) and as to the capacity of the interceptors.

The ensuing deadlock could only be resolved by legislation and in 1858 the Metropolis Local Management Amendment Act was passed containing a Section leaving the Board free to construct the works "according to such plans as to them may seem proper". It is interesting to recall that 1858 was called "the year of the Great Stink" bringing the acuteness of the problem literally to the front doors of the politicians in whose hands the resolution of the deadlock ultimately resided!

It is also worthy of note that the 1858 Act also amended the 1855 Act (i.e. the Act which created the Metropolitan Board of Works) so that in future the Board was not charged with preventing **all** sewerage within the Metropolis

from flowing into the Thames, but only with preventing that happening "as far as may be practicable . . ."

Thus with the necessary statutory legislation, and with the Metropolitan Board of Works rearing to go, work started in 1859 on the Bazalgette works which form the backbone of the drainage system of London at the present time. In 15 years, some 100 miles of interceptor sewers, outfall sewers (which conveyed flows eastwards from the interceptor sewers to storage tanks situated downstream of the Metropolis) and storm relief sewers (which conveyed storm water into the River Thames) were constructed — often under very difficult conditions.

The three interceptors north of the Thames were:—

(a) the High Level from Hampstead, through Upper Holloway and Hackney to Old Ford;

(b) the Mid Level from Kensall Green, through Notting Hill, Oxford Street and Bethnal Green to Old Ford; and

(c) the Low Level from Pimlico (later extended westwards to Hammersmith) along the Embankment to Tower Hill and Commercial Road and then to the Abbey Mills Pumping Station at Bow.

The schemes prepared in 1856, and made possible by the Act of 1858 were completed about 1874. It was at that time considered that the new system would serve the needs of London indefinitely and few additional works were carried out in the next few years. But it soon became evident that the discharge of sewerage on the ebb tide was not proving satisfactory. The large reservoir made at Barking on the north side of the Thames and at Crossness on the south side were respectively only 11 and 13 miles below London Bridge by river and no attempt had been made to treat the sewage before its discharge into the river at these points. It was found that the sewage discharged on the ebb tide could not reach the estuary of the Thames on that tide with the result that it was being brought back on the incoming tide. So, in 1882, a Royal Commission was appointed to inquire into and report upon the matter. In 1884 the Royal Commission concluded that the London sewage ought not to be discharged in its crude state into any part of the Thames; that the solid matter in the sewage should be separated from the liquid by some process of deposition or precipitation, and should be applied to the raising of low-lying lands or burnt, or dug into land or carried away to sea; and that the liquid portion of the sewage remaining after precipitation might, as a temporary measure, be then allowed to pass into the river.

Thus the precipitation works at Barking were commenced by the Metropolitan Board of Works in 1887 and completed in 1889, shortly after the London

County Council was constituted. The London County Council took over the duties of the Metropolitan Board in 1889 and it was now becoming evident that with the continued increase in population (and with the additional use of water for both domestic and industrial purposes) additional sewage capacity was necessary. The advent of the motor car in the early part of the century produced its own problems for the paving of roads with impermeable surfaces caused rapid run off of storm water to an extent not previously experienced. Thus on the north side of the Thames two extra west-east interceptor sewers together with two additional outfall sewers were built between 1900 and 1913.

Since then much work has been carried out to the London drainage system by increasing the capacity of the sewers and pumping stations and by developing more hygienic means of sewage disposal. The system was run by the London County Council and later by the Greater London Council through its Department of Public Health Engineering under the Public Services Committee.

The Water Act, which took effect in 1974, effectively transferred many of the functions of the Greater London Council's Public Health Engineering Department to the Thames Water Authority, one of the ten Regional Water Authorities created in England and Wales. This Act was designed to bring all water services into new authorities based on natural river catchments instead of on County boundaries. But the Rivers Branch of the Greater London Council's Public Health Engineering Department stayed with the Greater London Council which is why the Thames Barrier was constructed by that Council.

And so today it is the Thames Water Authority which has the challenge of providing the City of London with an efficient drainage system, a system which is just part of the labyrinth of drains of varied sizes, types, construction and dates which serves the whole of the London Area. That Authority has inherited a combined foul waste and rain water system which contains many interesting engineering features but the size of the sewers and the volume treated at the sewage treatment works could have been radically reduced by the use of separate systems — one for foul sewage and one for storm water. But historically London has one system and the Thames Water Authority has accepted the challenge of maintaining and improving what is perhaps the most important of all the public services required by the population of London.

I would end by acknowledging a debt of gratitude to 3 persons without whose assistance I could not have prepared this paper. First to Mr. Graham Cox, a consultant with M. McDowell Co. Partnership who has supplied me with much background information; to Mr. James Sewell, the Deputy Keeper of the Records of the Corporation for providing me with some papers relating to the Commissions of Sewers; and to Mr. B.J. Nithsdale of the Thames Water Authority who arranged for me to walk down the Fleet Sewer from Ludgate

Circus to Blackfriars Bridge, thus giving me the opportunity of understanding some of the problems and achievements of those responsible now and in the past for the sewers serving the City of London.