

GREATER LONDON COUNCIL  
DEPARTMENT OF PUBLIC HEALTH ENGINEERING

LONDON'S MAIN DRAINAGE SYSTEM

Before man established the first small settlement on the Thames where the City of London now stands, the rain falling on the high ground on each side of the river valley was drained to the Thames by a number of streams. As the inhabited area spread, and houses were built and streets paved, most of these streams were bricked in, diverted below the streets and eventually became sewers carrying the wastes of the inhabitants as well as the rainwater running off the ground.

By the middle of the 19th century these former streams and many other sewers that, as development had spread, had been specially constructed, were discharging into the Thames the wastes from a population of over two million. The appalling state of the river and the disastrously inadequate drainage system in the capital eventually made the authorities aware of the urgent need for drastic improvements and this need was emphasised by severe cholera epidemics between 1830 and 1854. Eventually, in 1855, the Metropolitan Board of Works was constituted. All the sewers discharging to the Thames were vested in them and they were given the duty of preventing as far as possible the flow of sewage into the Thames in the metropolitan area. Under their Engineer, Sir Joseph Bazalgette, they had a number of 'intercepting sewers' constructed, flowing from the western boundaries of their area (Hampstead, Hammersmith, and Putney) eastwards to converge eventually at Beckton on the north bank of the Thames and at Crossness on the south. As their name implies, these sewers intercepted the main sewers and instead of permitting the flow to continue to the Thames, carried it eastwards to Beckton and Crossness where the sewage was to be discharged to the river on the ebbing tide.

At places in the sewerage system, pumping stations were constructed where the sewage was lifted (in one case nearly forty feet) before being allowed to continue flowing eastwards by gravity.

Bazalgette's scheme provided sufficient capacity in the sewers for all dry-weather flow and, in addition, for a small volume of rainfall. Volumes in excess of the amount that could be contained in the spare capacity provided, was allowed to overflow weirs at the junctions of the old sewers and the interceptors and to continue down to outlets to the Thames. Subsequently, to relieve flooding from tide-locked sewers, storm sewage pumping stations were constructed together with a number of 'storm relief' sewers, which in dry weather carry no flow but which at times of heavy rain accept overflows from the dry weather sewers and carry them to river outlets.

At the time of the formation of the London County Council, river pollution was again appreciable and further intercepting sewers were constructed and also storm sewers to reduce flooding risks. Since 1913 no further intercepting sewers have been constructed and flows in excess of intercepting sewer capacity have been discharged to the river.

Towards the end of the century, the reservoirs at the outfalls were converted to sedimentation channels through which sewage was allowed to flow at a controlled rate so that as much as possible of the solid matter sank to the bottom of the channels, permitting a clarified effluent to be discharged to the Thames. The solid matter - sludge - was removed periodically and conveyed to sea in a specially constructed fleet of six vessels.

Today the effluent from sedimentation tanks receives further treatment by biological processes and the sludge, before it is disposed of, is treated so as to render it innocuous. A gas is obtained and is used as fuel in engines driving alternators and compressors producing all the power and air needed on the works.

ABBEY MILLS PUMPING STATION was constructed between 1865 and 1868 as part of Sir Joseph Bazalgette's scheme for the main drainage of London.

The central building of the pumping station which originally housed the great steam-driven beam engines was built by Bazalgette and Cooper to designs in the Venetian Gothic style showing strongly the Ruskinian influence at that time. Although it is not at present listed as being of special architectural or historic interest, it is a fine and particularly ambitious building characteristic of the palatial manner in which the Victorians housed their major engineering feats.

Externally the plan is cruciform with an octagonal lantern over the crossing and subsidiary domed square towers in the re-entrant angles. Each arm of the cross terminates in a massive porch based on North Italian models and use is made of polychromatic decoration in various materials.

The interior of the building is no less interesting. The beam engines originally stood under the crossing, which is of cathedral-like proportions, a space increased in size and effect by the presence of deep pits to contain the machinery. The crossing is supported by cast-iron columns of highly decorated Gothic forms.

The two Northern Low Level Sewers (10'3" and 10'6" diameter), the Isle of Dogs Branch Sewer (9'0" diameter) and the West Ham Diversion sewer (11'6" diameter) meet at the station and the sewage and part of the storm water from the Low Level system is lifted about 40'0" to the Outfall sewers, which lie in the embankment on the northeast side of the station, in which the flow gravitates to the Beckton Works, some four miles distant. Storm flows above a prescribed limit are diverted and pumped direct to Abbey Creek.

The low level area of North London from which all dry weather flow is pumped to the Northern Outfall Sewers at Abbey Mills covers in all about 52 square miles and comprises all or part of the London Boroughs of Camden, Ealing, Islington, Hackney, Hammersmith, Kensington and Chelsea, Newham, Tower Hamlets, Waltham Forest and Westminster.

Station A (formerly called the main engine House) was built between 1865 and 1868 and originally housed 8 beam engines, two in each arm of the building, of a gross capacity of about 112,000 gallons a minute. The engines and the associated sixteen Cornish-boilers were built by Rothwell and Co., Bolton. The engines were on a scale which matched the building, with cylinders 4'6" in diameter and stroke of 9', beams 40' long and flywheels 28' in diameter. These sets were removed in stages between 1931 and 1933 and replaced by 8 electrically-driven centrifugal pumps with a gross capacity of 224,000 gallons a minute. Practically all the dry weather flow pumping is done by these pumps.

Station B (formerly called the diesel engine house) was built between 1891 and 1896; was re-engined in 1934 and has again been modified in 1972. The plant now includes 2 electric-driven and 2 diesel-driven pumps which are used for dealing with flows from the Isle of Dogs Branch sewer and the diverted flows from West Ham pumping station. The gross capacity is about 50,000 gallons a minute. These sets pump only to the Outfall Sewers.

Station C (formerly the gas engine house) was built between 1910 and 1914 and contains "Premier" gas-engined centrifugal pumps with a gross capacity of 156,000 gallons a minute. These pumps are generally used only for storm water and pump either to the Outfall sewers or to Abbey Creek. Work has commenced on the replacement of the gas engines by high-speed diesel engines.

Station D was built in 1970/71 as part of the scheme for diverting the West Ham flows into Abbey Mills, and is used for pumping storm water only to the Abbey Creek. The electrically driven pumps, with a gross capacity of 90,000 gallons a minute are operated by remote control from the panel in Station A.

Stations A, B and C are at present manned continuously for pumping the dry weather flow of sewage and for starting additional pumps when required during rainfall. With the installation of the new plant in Stations B and C opportunity is being taken to provide for the remote control of this plant from Station A.

The total number of men employed at the Stations is 75 but on completion of the remote control installation the number will be reduced to 57.

WEST HAM PUMPING STATION was constructed by the borough under powers obtained in the West Ham Corporation Act 1893, and, until it was abandoned in January 1972, pumped sewage from the West Ham area to the Northern Outsell Sewers.

The buildings are less distinguished than those of Abbey Mills and their interest lies in the original steam-powered pumping plant, now disused. This comprises two compound (two cylinder) engines built by the Lilleshall Company of Shropshire, each with a high pressure cylinder of 2'6" diameter and a low pressure cylinder of 4' diameter. Each has a cast-iron beam 30' long weighing 17 tons and a flywheel 22' diameter and drove two bucket pumps, 5'6" in diameter, which lifted dry-weather flow over 40'. Steam was

generated in the adjacent boiler house, in seven of the original nine Lancashire boilers built by Spur Inman of Wakefield. The octagonal brick chimney is 120' high.

To cope with additional storm flows, the station had three reciprocating steam engines driving centrifugal pumps. Two of the engines were built by John Cochrane of Barrhead. The third was purchased second-hand and its origin is unknown.

A sewer has now been constructed to divert the flow to Abbey Mills Pumping Station, and West Ham Pumping Station has become redundant.

June 1972