

WATER, DRAINAGE, PEOPLE AND HERITAGE



**ENGINEERS IRELAND
22 CLYDE ROAD, DUBLIN**

Michael Corcoran, Drainage Division, Dublin City Council

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Introduction

Water and drainage are two of the most vital services in maintaining our health. What follows is a brief look at the major Dublin systems - six for water and seven for drainage - that our city and suburbs have relied on over the centuries. It is also right to pay tribute to a few of the many individuals who, in very difficult times, contributed so much both to engineering and improving peoples' lives. The work and foresight of those long departed heroes laid the foundations of the comfortable lifestyles we enjoy today.

The Poddle, the Liffey and the Canals

The story starts with water, on the 29th April 1244, when Maurice Fitzgerald, Lord Justiciar of Ireland, started the process that gave Dublin its first water supply, which was to serve the city for more than 530 years.

A weir was built on the River Dodder at Balrothery to divert water to the Poddle, a stream rising where Tallaght Hospital now stands. This little river, its waters augmented from the Dodder weir, still flows through Kimmage to the Tongue, downstream of Sundrive. Here it bifurcates, two thirds flowing via Harold's Cross to Blackpitts, passing St. Patrick's Cathedral and Dublin Castle on its way to the Liffey at Wellington Quay. The other third flowed from the Tongue via the City Watercourse to Dolphin's Barn and James's Street, from where the city was supplied. There was a conduit or cistern at Cornmarket.

Modern Dublin began to develop in the 1660s. Water management was improved and a Poddle supply went to the north side around 1670, supplementing that from the Bradogue, which flowed from Cabra through Grangegorman and Broadstone to the Liffey at Upper Ormond Quay. An early instance of industrial pollution was tackled in 1718 when powers were obtained to deal with discharges to the Poddle.

The population of the city, around 60,000 in 1682, doubled to nearly 120,000 in 1721. In that year, a new city basin, capable of holding 25 million gallons or three month's supply, was built at James's Street to supply 90 streets. By that time, wooden water mains were being used, replacing the lead pipes or open channels that previously carried the supply.

. As the city developed, the Poddle supply became ever more inadequate and many householders sank wells, used rainwater barrels or bought water from hucksters. James Scanlan, appointed engineer in 1739, improved the supply to the north side in the 1740s by taking water from the Liffey at Islandbridge and pumping it through two six-inch wooden mains; a total of 185 streets now needed the service.

While the Grand Canal was under construction in 1765, the Corporation entered into a contract with the canal company to supply water, which was flowing through the basin by 1778. When the Royal Canal was under construction in the first decade of the nineteenth century, a basin was built beside its Broadstone branch at Blessington Street to supply the north side, and a second Southside basin was constructed on the extension of the Grand Canal to Ringsend. This basin, at Portobello, supplied the southeast suburbs and became operational in 1812.

Governance, Health and Early Drainage

For centuries, the City Assembly, an unwieldy body whose power derived largely from patronage and increasingly irrelevant medieval guilds, governed Dublin. There was widespread corruption and democracy as we know it did not exist. Despite this, good work was carried out by committees set up to perform specific tasks; the Wide Street Commissioners are probably the best known. Another commission, set up in 1763 to build a circular road around the city, took more than thirty years to complete what became the city boundary until 1840.

Dublin was a prosperous city in the late eighteenth century, second only to London in the British Empire and with a population approaching 200,000. But, despite the sophistication of that era, the most fundamental principles of hygiene and public health were either unknown or ignored. Foul drainage went into cesspits, which needed periodic clearing, and surface water flowed in open channels to the nearest watercourse. When foul discharges were allowed into these channels, river pollution became a worsening problem.

Responsibility for "paving, cleaning, lighting, draining and improving the streets, was placed on a board appointed in 1774. Known simply as the Drainage Board, this commission was replaced or reorganised in 1807 and again in 1827. The Board, which charged individual householders for the building

of sewers, could not collect money to provide drainage in poor areas. What life was like in the poor areas was described graphically by one of the heroes in this story.

James Whitelaw, who was born in 1749, is remembered mainly as a historian but rather less as a compassionate pastor with a strong social conscience. He was appointed Rector of St. Catherine's in Thomas Street in 1788 and his record of the appalling state of the people in the Liberties can still shock more than 200 years after it was written. In 1813, Rev. James Whitelaw died aged 64, a victim of illness contracted from the poor to whom he ministered.

After the Act of Union – the Townships

Dublin endured a long period of decay following the Act of Union in 1801. There were already slum areas in the southwestern sector of the city, badly affected by the decline of weaving and the movement of prosperous people to more upmarket areas to the east. Migration from impoverished rural areas, worsened by the 1798 rebellion and the Napoleonic wars, resulted in serious housing problems that were to fester for more than 150 years. There was also the depressing fact of so many destitute and unhealthy people living in pestilential tenements, without the barest amenities such as pure water or drainage.

During the early years of the nineteenth century, the Pipe Water Establishment, as the waterworks was called, endeavoured to maintain supply and introduce new technology, the replacement of wooden mains by metal ones being a priority. A remarkable figure of this period was Andrew Coffey, who was born in 1848 and joined the Pipe Water Establishment in 1774. He became Waterworks Engineer in 1804 and served until shortly before his death in 1832, aged 84. Coffey rebuilt the Balrothery weir in the early years of the century and also proposed the use of steam power to pump water from the Liffey at Islandbridge. He was wrongfully suspended for the malfeasance of others in 1828 and, following vindication, was reinstated with a salary of £400 per annum.

As once prosperous areas sank further, people who could afford to move out did so, a trend that resulted in the development of independent townships outside the city. Commuting was further encouraged by the opening of suburban railway lines from 1834 onwards and tramways from 1872. The 1828 Lighting of Towns Act and subsequent legislation facilitated the establishment of townships, administered by propertied people prepared to take on certain responsibilities. In 1834 Kingstown (Dunleary) became the first of nine townships in the Dublin area. Neighbouring Blackrock was established in 1860, Dalkey in 1863 and Killiney & Ballybrack in 1866. Other independent townships were established immediately outside the city boundary: Rathmines (1847), Pembroke (1863), New Kilmainham (1868), Clontarf (1869) and Drumcondra (1878).

The conditions under which poor people subsisted in the townships were no better than those in the city. Another great humanitarian active at that time was Mother Mary Aikenhead (1787-1857), who founded the Sisters of Charity in 1815. She laboured long and hard among the destitute and gave forceful evidence about conditions in Ringsend and Sandymount to a Royal Commission in 1833. Despite the work of Mother Mary and her colleagues, the sufferings of the poor seemed even worse than those described by the Rev. Whitelaw in 1798.

Improvements begin - at last

The 1840 Municipal Corporations Act, which provided for the election by ratepayers of a reformed City Council, was the beginning of local democracy and the long process of improvement in Dublin. The canals and circular roads formed the 1840 city boundary, creating a compact city, but one incapable of expansion because of the existence of the townships.

During the 1840s, there was growing acceptance of the need for improved health and hygiene. The philosophy of utilitarianism, which stated that every action should result in the greatest good for the greatest number of people, was steadily gaining support. This philosophy, overlaid with great compassion, motivated Dr. Thomas Willis, apothecary (1790-1881) to campaign tirelessly for the poor. In 1845, he produced a searing report on conditions in the Church Street area. He followed up with evidence to a parliamentary committee and while he had the satisfaction of seeing tangible improvements starting around 1850, he continued his labours for several more years.

The provision of vital services was facilitated by the Dublin Improvement Act of 1849. Public health, a pure water supply and adequate drainage became ever more serious considerations in the mid-nineteenth century. Control and development of water and drainage services by a single professional

department were now essential. This was achieved with the arrival into the Corporation of Parke Neville, one of the giants in Dublin's modernisation.

Neville, who was born in 1812, underwent rigorous training both as a civil engineer and an architect. In 1851, he was appointed as the first full-time Dublin City Surveyor, to which post the new duties of City Engineer were added in 1857. He extended and improved the drainage system, but is best remembered for the construction of the Vartry water scheme. Neville held office as President of the Institution of Civil Engineers and was also Vice-President of the Institute of Architects. He served Dublin with distinction for 35 years, achieved great things, but was frustrated in doing even more by the parsimony and shortsightedness of others.

By 1849, the Commissioners for Paving and Lighting had constructed 35.5 miles of sewers. Between 1851 and 1879, Parke Neville built 65 miles of new sewers and improved about 30 miles of the existing ones. The new sewers, which carried both foul and surface drainage on the combined system, were ovoid in shape and capable of taking at least three times the dry weather flow. However, they all discharged to outfalls on the Liffey: 22 on the north side and 32 on the south. To purify the Liffey, Neville proposed interceptor sewers along the quays as early as 1853 but these did not materialise for more than fifty years.

The Vartry Water Scheme

In Dublin, water supply agreements with the canals were due for renewal around 1860, but the companies were unwilling to satisfy the Corporation as to pressure and quality. Royal Commissioner Sir John Hawkshaw reported in October 1860 that Dublin's water was bad and the urgently needed new supply should be obtained from the Vartry River in County Wicklow. He was influenced in his choice from six alternatives, by the fact that the Vartry would serve populous areas to the south of Dublin.

The canal companies indulged in many underhand ploys to defeat the Vartry scheme, but they reckoned without Sir John Gray, whose name will forever be linked with municipal progress and the highest standards in public life. Born in 1815, he qualified as a physician, but was better known as a public representative and journalist - and proprietor of the *Freeman's Journal*. He was an independent MP for Kilkenny and a Dublin City councillor. Gray was a friend of Parke Neville with whom he collaborated on several municipal projects, especially the Vartry scheme which he guided through Parliament in the face of vicious opposition. When the future of the Vartry scheme was assured, he bought up all the necessary land and transferred it to the Corporation for exactly what he paid for it, thus closing out speculators. Knighted for his great work on the Vartry project, Sir John Gray later chaired the Main Drainage Committee but died in 1875, aged 59. His statue looks down O'Connell Street from the Abbey Street junction.

Rising on the Sugar Loaf mountain, the Vartry is 17.5 miles long and has a catchment area of 34,890 acres. Work on the water scheme began in November 1862 and took six years to complete. About a mile and a half southeast of Roundwood, an embankment, 1,640 feet long, 28 feet wide and carrying the Roundwood-Wicklow road, was constructed to create the reservoir. The water level here was 632 feet above ordnance datum. The area of land covered was 409 acres, the greatest depth of water 66 feet and the capacity 2.4 billion gallons, enough for two hundred days' supply for the 1860s city. Two other embankments were constructed to carry county roads across the reservoir. The Vartry dams are earthen embankments with puddle clay cores keyed into the underlying rock.

Water purification consisted of slow sand filtration; today, chemical disinfection follows, chlorine gas killing off any residual pathogenic organisms. Fluoride and lime are added to the filtered water, the first to prevent dental caries, while the latter corrects the natural corrosiveness of the raw water. Roundwood originally had seven filter beds, and three more were added in 1873.

From Roundwood, the water passes through the Callowhill tunnel, six feet high, five feet wide and 2.5 miles long, with eight airshafts. Work on the tunnel began in January 1863 and was completed in September 1866. Two early experimental boring machines were tried unsuccessfully in the tunnel. The first, invented by Dubliner George Robert Low, was designed to work two drills simultaneously at the rock face. However, because of the small size and rectangular shape of the Vartry tunnel, only one could be used. It was found as a result of trials that faster progress could be achieved with three shifts working round the clock.

Fred Beaumont, an Englishman, devised the second machine. Parke Neville observed "the experiment continued for about eight months at great expense to the inventor." Beaumont's machine had a series of chisels or jumpers fixed to the perimeter of a slowly rotating disc, which cut a continuous groove the full

five feet diameter of the machine. Simultaneously a hole was bored in the centre of the disc into which charging powder could be packed and fired to break up the isolated disc of rock. Although Beaumont's machine failed at the Vartry, due to the hardness of the granite and the limitations of metallurgy at the time, he continued to develop rock-boring machines and achieved considerable success. In 1881 two seven-foot diameter Beaumont machines worked very successfully in the earliest attempt to construct a Channel tunnel.

From the break-pressure tank at the end of the tunnel, a 33-inch diameter main was laid over the 17 miles to Stollorgan, passing through three more break-pressure tanks at Kilmurray, Kilcrouney and Rathmichael. Between 1891 and 1907, an additional 27-inch main was laid from Roundwood to Stillorgan.

Under the provisions of the 1861 Act, Dublin Corporation became the statutory water supplier for large areas of South County Dublin and North Wicklow, known as the extra municipal districts. Supplies for Greystones and Bray are taken off the main coming into Stillorgan, and Wicklow Town is served direct from Roundwood

Two distributing reservoirs, covering more than 26 acres, were constructed at Stillorgan, each with a capacity exceeding 43 million gallons. An additional reservoir capable of holding more than 94 million gallons was built in 1885. Water coming into Stillorgan from Roundwood can discharge directly into the reservoirs or into the octagonal screen house. Twin 27-inch diameter mains, later supplemented by two additional 24-inch pipelines, take the water from Stillorgan to the city.

At Merrion Avenue, Simmonscourt and Leeson Street, groups of valves enabled the two mains to be connected. Township water was delivered to the boundaries, delivery mains and local networks being financed and laid by the local commissioners. In the case of Kingstown, the Corporation had to buy out the Kingstown Water Company and provide drinking fountains in the township.

At Eustace (Leeson Street) Bridge, the two 27-inch mains diverged. One went northwest to the Coombe and crossed the Liffey to Queen Street and North King Street. The other went by Fitzwilliam Street to Brunswick (Pearse) Street, across O'Connell Bridge to Dorset Street and back to North King Street where it met its counterpart, forming a high-pressure ring around the city centre. Completion of the Vartry programme resulted in the replacement, cleansing or relaying of 50 miles of watermains; with the existing 60 miles, this brought the network up to 110 miles.

For many years, the Vartry supplied the city's water needs on its own. It failed only once, in 1893, when an unprecedented drought forced the Corporation to revert briefly to canal water. A second Roundwood reservoir, begun in 1908 and finished in 1923, has successfully safeguarded against a repeat of 1893. Four additional filters were constructed at Roundwood in 1930-1932.

Sir Charles Cameron

As work on the Vartry scheme got under way, one of the most remarkable figures in the history of Dublin becomes part of this narrative. The life and work of Sir Charles Cameron, who was born in 1830, straddles several periods of this story. Cameron studied chemistry as well as medicine and was appointed an analyst with Dublin Corporation in 1862. He combined this post with that of medical officer in 1874, assisting the city's first Chief Medical Officer, the distinguished Dr. Edward Maypothor. He succeeded Maypothor as Chief Medical Officer in 1880 and campaigned relentlessly to improve the health and living conditions of the poor. Cameron received his knighthood in 1885 and was given the freedom of the city in 1910, two years before he retired. He worked on until 1921 when he died at the age of 91.

An amazing episode in Cameron's career occurred in 1885, when the Prince of Wales, the future King Edward VII, visited Dublin. Senior officials brought the royal visitor on a tour of the city, pointing out the great squares and public buildings, which greatly impressed the prince. Later, Cameron persuaded the Prince to accompany him on a tour of his own, when he brought Edward to the most deprived areas of the city and these made a much deeper impression on the prince. Only Cameron, a man of immense courage, compassion and energy, could have accomplished such a coup.

Main Drainage – Rathmines and Pembroke

Throughout the nineteenth century, the pollution and stench of the Liffey grew steadily worse. Neville's 1853 proposals for intercepting sewers were endorsed by famous doctors, including Sir Dominic Corrigan and Edmund Maypothor. Unfortunately, an 1854 reduction in valuation, the departure of wealthy

residents to the townships, and low municipal income long prevented the allocation of funds for this most urgent project.

Sir Joseph Bazalgette, who constructed London's main drainage and many other amenities, was consulted and concurred with Neville. Following approval of an Exchequer loan, the Dublin Main Drainage and Purification of Liffey Act of 1871 authorised the work, which also included the Rathmines and Pembroke townships. But, because the lowest tender was more than twice the approved expenditure, the scheme did not proceed. Frustrated by the course of events and the increasing pollution of the Dodder, the wealthy Rathmines and Pembroke townships then decided to provide their own joint main drainage scheme.

Designed to cater for an area of 3,295 acres and with an existing population of 50,000, the Rathmines and Pembroke (R & P) Drainage Bill became law in July 1877 and work began a year later. A high-level interceptor sewer was built along the course of the Swan River from Harold's Cross via Rathmines, Ranelagh, Wellington Place and Ballsbridge. From here, the interceptor followed the Dodder to Londonbridge Road where it siphoned under the river, beside another sewer coming from Pembroke and Shelbourne Roads

A third, low-level, sewer was laid beside the railway from Sydney Parade to Lansdowne Railway Bridge, continuing along the east bank of the Dodder to the pumping station at Londonbridge Road. This pumping station lifted the sewage to a high level culvert into which the sewers siphoning under the river also flowed. From Londonbridge Road, this high-level culvert ran to Whitebanks on the South Wall. Sewage was stored in the culvert during the flood tide and discharged on the ebb through valves in a stone building at Whitebanks.

Rathmines Water - Bohernabreena

Because of a parsimonious culture and their hostility to Dublin Corporation, the Rathmines Commissioners refused a Vartry water supply. Instead, they established a system that took water from the Grand Canal, upstream of the Eighth Lock at Gallanstown and at a level of 178 feet above Poolbeg Datum. A compact filtration plant with covered clear water tanks was constructed on the site of just under two acres. There were six filter beds and two covered reservoirs and the plant was capable of processing two million gallons a day.

A 15-inch pipe conveyed the water for over two and a quarter miles, at which point it flowed into two pipes, twelve and nine inches in diameter, to the township boundary and into the distribution network. The system was both obsolete and a health hazard even as it began operating on 23rd July 1863. The supply was also intermittent and a pumping station had to be built at Harold's Cross, with a water tower in Rathgar to serve the higher parts of that district. It is recorded that two engines pumped all night at Harold's Cross to supply Rathgar via a 9-inch main, causing additional expenditure and raising the cost of the waterworks to £29,000.

Rathmines residents were unsettled with a meagre supply of hard, low quality canal water while the other townships and the city enjoyed abundant Vartry water that was soft and pure. The Rathmines Commissioners therefore decided to seek something better. Failing yet again to agree terms with Dublin Corporation for a Vartry supply, they obtained an Act in 1880 authorising construction of the Dodder or Bohernabreena scheme.

Robert (1810-1881) was a distinguished engineer who, in a report of 1844, examined the river in great detail. He noted its capacity to cause serious flooding and the effect of variations in flow on the many mills along its course. While he suggested the building of a dam at Bohernabreena, this would have been a control device, without any thought of a water supply. The Dodder was in fact considered as a source of water for Dublin by Parke Neville in the 1850s, but no detailed proposals were formulated. Designed by Richard Hassard, a Dodder waterworks materialised in 1887 and was capable of delivering three million gallons per day to a population then standing at 30,000.

The Bohernabreena Works lies at the foot of Kippure Mountain, 2,473 feet high. It is in the valley of Glenasmole through which flow the Dodder and its tributaries, the Cot and Slade brooks. The gathering ground covers 4,340 acres. Very heavy flash floods affect the valley periodically and there have been several landslips, and a peculiarity of the catchment is that the water flows off the slopes very quickly. The overflow weirs of the upper reservoir were therefore made 200 feet in length to deal with the excess water. On 25th August 1905, the highest rainfall recorded up to that time occurred. In the space of 27 hours, 6.23 inches were recorded, with five inches falling in nine hours.

To compensate the many mill owners on the Dodder for the reduction in river flow due to water abstraction, a second reservoir was constructed just below the waterworks reservoir. From this lower reservoir, compensation water could be released to maintain an adequate flow in the river during dry periods, permitting continued operation of the mills. The upper or clear water reservoir contained 360 million gallons, with its top water level 578 feet above Ordnance Datum. The lower or mill owners' compensation reservoir had a capacity of 156 million gallons, its top water level being 495 feet above datum. This reservoir had catchwaters, a gauge basin and duplicate measuring flumes for preferential supply to mill owners.

Water for Rathmines could be drawn off from the upper reservoir at different levels. After passing through a gauge basin it was carried through 4½ miles of 15-inch pipes, with two relief pits en route, to slow sand filter beds at Ballyboden. It then passed to an adjacent open service reservoir with a capacity of 12 million gallons, about 2¾ miles from the township. This reservoir was an impoundment contained in an earthen embankment at 327 feet above Ordnance Datum and 175 feet above the highest point in the township. From Ballyboden, the water passed through copper wire fine screens and was delivered to Rathmines by two pipelines, 18 inches and 12 inches in diameter.

The Rathmines Grand Canal Works at Gallanstown, made redundant by the Bohernabreena scheme, was purchased by Dublin Corporation in 1893. A settling basin of 2.5 million gallons capacity was added in 1925, and a covered clear water tank that could hold four million gallons. In 1868, the Corporation had built a small waterworks on the Grand Canal at the Fifth Lock in Inchicore, 147 feet above datum. Its primary purpose was to supply the Dublin breweries and distilleries with the same quantity of water as they had used prior to the introduction of the Vartry supply. Gallanstown was connected to the Fifth Lock Works. A 15-inch pipe was laid to deliver water to the city and in 1932 the Grand Canal Company could supply 4 million gallons to the two installations, when the supply from these sources was 1.4 million gallons per day.

Drumcondra, Clontarf, Kilmainham

Rathmines and Pembroke were the best endowed of the five townships immediately outside the city boundary, Rathmines actually accomplishing three boundary extensions up to 1880. The other three townships - Drumcondra, Clontarf and New Kilmainham - had modest drainage systems, and they all obtained water from the Vartry scheme.

Plans to drain Drumcondra and Glasnevin were prepared in 1880, when Clonliffe Road had open channels or ditches conveying the filthy contents of house and yard drains alongside the public road. The Drumcondra network of seven main sewers facilitated development well into the twentieth century. They all flowed via Richmond Road or Clonliffe Road to clarifying tanks on the south bank of the Tolka, west of Ballybough Bridge.

Straddling the railway line, Clontarf relied exclusively on discharges to the foreshore for its drainage. Most of the New Kilmainham sewers flowed to the Camac, already grossly polluted by industrial effluent from several paper mills along its course upstream of the township.

The 1906 Main Drainage Scheme

In 1880, Royal Commissioner Sir Robert Rawlinson brought forward proposals for Dublin's main drainage, but his report was not acted on for more than ten years. Meanwhile, Parke Neville, City Engineer for 35 years and still frustrated by delays to the implementation of the Main Drainage Scheme, died on 30th October 1886.

Parke Neville was succeeded as City Engineer by yet another great figure. Spencer Harty, who was born in 1838, gained his early experience as a resident engineer on the Vartry scheme and kept diaries, at least one of which survives. Following his election as City Engineer by the councillors in March 1887 - as was the practice at that time - he expedited the Main Drainage Scheme, which was intended to cater for a population of 400,000 people and several districts outside the city boundary.

Work finally began in 1896 and took ten years to carry out. On its completion, Spencer Harty's several contributions to the city were recognised when he received the freedom of the city in 1907, the same year as he began the reclamation of the Fairview sloblands. He also became a Justice of the Peace, retired in 1910 and lived until 1923. Harty is one of the historic figures immortalised in *Ulysses*, in the passage where Joyce describes what happens when a tap is turned on.

The main features of the Main Drainage system in the city centre were the interceptor sewers along the North and South Quays, taking the flow from the 54 Liffey outfalls, but omitting the Camac and Poddle rivers. From Eden Quay, opposite Marlborough Street, the North Quays interceptor crosses under the Liffey in a siphon three feet four inches (1m) in diameter, joining its South Quays counterpart on Burgh Quay. The North Strand sewer, coming in via Talbot Street and Marlborough Street, flows into the Eden Quay leg of the siphon.

At Hawkins Street, the combined flow from the riverside interceptors goes over a weir and into an eight feet (2.43m) diameter tunnel. This tunnel runs via Hawkins Street, Townsend Street, Hanover Street, Ringsend Road, Ringsend Park and Pigeonhouse Road to the Main Pumping Station, which operated for 79 years until 1985. Here, the sewage was screened and lifted 23 feet to a high-level eight feet diameter tunnel leading to the Outfall Works at the Pigeon House. The original steam pumping plant at Ringsend was replaced by electricity in 1923-24.

At the Pigeon House, 0.68 (1km) from the Pumping Station, there were eighteen precipitation tanks, each with a capacity of 6.5 million gallons. The tanks operated as sequencing batch reactors and when the sewage had settled the clarified liquid was drawn off for discharge to the Liffey. The sludge was shipped out to sea in the TSS *Shamrock* and discharged northeast of the Baily Lighthouse. The Main Drainage scheme cost £508,000 and was completed in 1906.

A feature of the Main Drainage Scheme was the widespread use of Portland cement and concrete. This had been pioneered by Sir Joseph Bazalgette in the London Main Drainage Scheme and, as in London, it proved successful and enduring in Dublin. Harry Nicholls, Who was Engineer- in-Charge in what was formerly Sewers and Main Drainage Department, referred to this in his Presidential Address to the Institution of Engineers in November 1953. He described how he had cut away a part of the eight-foot high-level sewer and found that after nearly 50 years, the concrete was still very hard and in good condition.

Local Government – Boundary Changes

The 1898 Local Government Act revolutionised local administration throughout Ireland. County Councils replaced Grand Juries and many townships became Urban District Councils. Power and responsibilities were now transferred to the democratically elected councils.

The five townships adjoining the Dublin City boundary achieved Urban District Council status but, as the result of a huge boundary extension, Clontarf, Drumcondra and New Kilmainham became part of the city on 15th January 1901. The three urban districts contained extensive tracts of undeveloped land that would eventually be used for municipal housing. The extension also brought in Cabra, Donnycarney and other County Council districts and more than doubled the municipal area from 3,733 to 7,894 acres. Wealthy and influential Rathmines and Pembroke retained their independence.

Extending the Drainage Network

As soon as the main drainage system became operational, the Corporation set about extending the sewer network. Districts hitherto serviced unsatisfactorily and as much as possible of the added areas were connected to the main drainage system. Sewage was also accepted from the neighbouring Rural District Councils (RDCs), which had come into existence in 1899.

A main drainage scheme for Clontarf began in 1906. An unavoidably flat interceptor sewer was laid for two miles from Dollymount to Clontarf Railway Bridge. Ejectors at Dollymount and Vernon Avenue, with lifts of 12.9 and 12 feet respectively, worked fairly satisfactorily for fifty years. Air for the ejectors was supplied via underground pipes from a compressor in the main ejector station at Clontarf. This station lifted the sewage 15 feet to flow to the high level sewer at Fairview. This sewer also drained the upper portions of Fairview and went through siphons under the River Tolka and the Royal Canal towards the city centre. Clontarf station had a second pair of ejectors to pump storm water into the sea.

Several of the necessarily flat Clontarf sewers had flushing chambers as heading manholes. These had water taps just below road level and lever controlled penstocks on the outgoing sewer. Opening the penstock on a full chamber cleared the pipeline in a spectacular fashion.

In 1910, the drainage of Drumcondra, which hitherto discharged to the Tolka at Ballybough Bridge, was diverted to the North Strand sewer via Poplar Row and Annesley Place. In 1926, the first Tolka

Valley sewer was laid from Drumcondra Road (Millmount Avenue), via Clonliffe College and Clonliffe Road to Poplar Row.

A drainage programme was prepared in 1912 for North Lotts, which had been partly drained in the late nineteenth century and contained East Road pumping station. Two additional pumping stations were planned, at Castleforbes Road and Mayor Street. Delayed by the events of 1913-1923, work on the North Lotts drainage programme resumed in 1927. Mayor Street pumping station diverted sewage that previously emptied into the Liffey at Commons Street back to Amiens Street and onwards to the Eden Quay siphon. Modifications to the original scheme included direct pumping from East Road to Ringsend through the new Liffey tunnel.

First considered in 1918, the Liffey tunnel rapidly became an urgent necessity. For several projects in the north-east of the city, services crossing through the tunnel conferred considerable engineering and economic advantages. Built between 1925 and 1928, the 831-foot tunnel carried electricity cables, a 24-inch watermain and the 15-inch diameter East Road-Ringsend rising main.

Cabra drainage was tackled in 1911 with sewers along both the Old and New Cabra Roads. Later extensions brought in Navan Road and the Ashtown district, part of which went to the Main Drainage system at Parkgate Street. The drainage of Chapelizod was delayed by the events of 1913-1924, but Chapelizod North was connected to the city system in 1928, followed by Chapelizod South in 1937. A feature of these schemes was the building of two pumping stations on the north bank of the River Liffey. The first is near the Chapelizod gate of the Phoenix Park, the second immediately west of Sarah's Bridge (Islandbridge). From this station, the sewer goes under the river to Hospital Lane, where it connects to the head of the South Quays interceptor.

Old Kilmainham, the part of this district inside the pre-1901 city boundary and east of South Circular Road, was drained in stages between 1862 and 1877. Sewers serving Brookfield and South Circular Roads and Old Kilmainham flowed into the Camac at Mount Brown. As part of the 1906 scheme, a 36-inch diameter sewer was laid beside the Camac to St. John's Road, and connected to the South Quays interceptor at Kingsbridge (Heuston) Station. This sewer takes in other lines that previously discharged into the Camac at Bow Bridge.

Crumlin, Terenure, Rathfarnham, Dundrum

Crumlin area drainage was effected in 1925-26 with sewers in Dark Lane (Sundrive Road) and Crumlin Road. These join at Herberton Lane (Road), go in tunnel under the Grand Canal and turn northeast towards St. James's Hospital. A tunnel under the hospital complex takes the line to Mount Brown where it joins existing sewers. The village of Crumlin was drained in 1929 by a sewer laid to the Inchicore system at Blackhorse Bridge.

South Dublin Rural District Council was the sanitary authority for Terenure. The Terenure sewer, a metal pipe for some of its length and completed in 1911 from Kimmage Road to Dean Street, has some manhole shafts that began 12 inches below the road surface. This arrangement, common on older sewers, precluded unauthorised access or connections.

The outlying district of Dundrum (Rathdown RDC) was taken into the main drainage system through an interceptor sewer laid along the south and east banks of the Dodder in 1911 and connecting with the Ringsend tunnel at Fitzwilliam Quay. Rathfarnham was linked to the Dundrum sewer in 1913.

More Boundary Extensions

The Local Government (Dublin) Act, 1930 brought about momentous changes and a massive boundary extension. Effective from 30th September 1930, the Urban Districts of Rathmines and Pembroke were incorporated into the city. Also taken in were the Bull Island, Raheny, Beaumont, Cabra and Phoenix Park on the north side, Chapelizod to the west and Rathfarnham to the south. A major change in administration also occurred with the appointment of Dublin's first City Manager.

Kingstown Urban District Council, which had changed its name to Dun Laoghaire in 1920, became Dun Laoghaire Borough in 1930. It now took in Blackrock, Dalkey and Killiney & Ballybrack UDCs. The Rural District Councils in the Dublin area were merged with Dublin County Council in 1930.

The first of two further boundary extensions took place in 1941 when part of Crumlin was transferred into the City area.

Howth Water and Drainage

Howth, which had become increasingly popular both as a residential area and as a resort for visitors, had its own water and drainage systems dating from the early twentieth century. Water was supplied from a reservoir at Balkill, which in 1904 was promised to provide 300 days' storage for a population 1,000 people. In 1923, a 12-inch main was laid to serve the peninsula with Vartry water and this was metered at Killester.

In February 1905, a public inquiry was held to consider drainage proposals for Howth. Margaret Rickard, a health inspector for the area, was one of the witnesses and so impressed the inspector that he expressed high hopes for her future. Ms. Rickard, who appears to have been appointed around 1901, must have been one of the earliest female professional officers in the local service

The most important of the original three-part drainage system in Howth, and which served for fifty years, consisted of two intercepting sewers. Running westwards from Balcadden was a flushing sewer, and eastwards from Corr Castle a gravity line. They flowed, via grit chambers, septic tanks and storage chambers, to an outfall at the West Pier that discharged only on the ebb tide. The system was intended to cater for an ultimate population of 3,600 people.

Sutton has a more primitive drainage system with two sea outfalls, which continued to operate until the late 1950s.

Serving the Growing Suburbs

The Malahide Road sewer drained the older parts of the Donnycarney housing estate from its beginnings in the early 1930s. A new main (the Clonturk Valley Sewer) was laid in 1937 to cater for Whitehall and allow for the further development of Donnycarney. This sewer begins to the west of Swords Road at Larkhill, and follows the course of the Wad River to Donnycarney (Scurloges) Bridge, where it joins an existing line on Malahide Road. Although the Wad River was culverted long ago, the parapets of the bridge on Malahide Road remain, showing a rebuilding date of 1896. Artane and Coolock were also drained in 1938 by an extension of the Malahide Road sewer northwards from Donnycarney.

The Clonturk Valley, Artane and Coolock sewers facilitated considerable house building along and adjacent to Malahide Road. This resulted in progressively more serious overloading of the drainage network throughout the 1940s and 1950s. In 1937, Raheny was connected to the existing Howth Road sewer near Ballyhoy Bridge, allowing for building in that area.

Finglas was drained in 1941, but the contours between the village and existing sewers presented problems. From the southern end of Main Street, the sewer struck off in a southeasterly direction through the present-day Glenhill Estate, which in 1941 was still open country. It then touched the sites of the future Griffith and Tolka Estates to reach Old Finglas Road, which it followed to connect with the former Drumcondra Township sewer at Glasnevin.

Waterworks Schemes: The Liffey

Following the 1930 boundary extension, the Rathmines Waterworks at Ballyboden was modernised. Its maximum output was increased to 18,000m³/day (4 million gallons) by the provision of a second raw water main and a physico-chemical treatment process replaced the slow sand filters. These changes improved the appearance and quality of the finished water, to which chlorine was now added to ensure disinfection. Rapid gravity filters replaced the slow sand type, and, in 1931, additional slow sand filter beds (Nos. 11-14) were also built at Roundwood to increase output

As extensive new suburban estates were built in the 1930s, it was clear that the existing waterworks would no longer be able to keep up with demand for supplies. The Liffey Reservoir Act 1936 empowered the Corporation to enter an agreement with the ESB for a supply from the Pollaphuca hydro-electric scheme, which created one of the largest reservoirs in these islands. Water is conveyed from the lake to a treatment works at Ballymore Eustace, which has been improved and extended several times over the years.

During the early 1940s, a small reservoir was built at Saggart, with a much larger one at Cookstown, near the present Tallaght Town centre. This was supplied from Ballymore Eustace. From Cookstown, the supply was taken across the Liffey via Cabra to Griffith Avenue, increasing the city supply by a quarter and guaranteeing enough water for the growing northern suburbs. During the 1950s, a main was laid from Saggart to bring surplus Liffey water to Ballyboden and Stillorgan as required; the three supply

systems were now linked. In the late 1960s the output of Ballymore Eustace was increased from 18 to 30 million gallons per day.

Thirty-five miles downstream from Pollaphuca, Dublin County Council developed the Leixlip water supply and treatment works. Begun in 1965, the first stage was completed in 1967 to provide a regional water supply for the towns and rural districts throughout the north county area.

Around the same time, the County Council considered a Liffey supply from Cloghlea, a possibility first considered a century earlier. When it became clear that this scheme would be inadequate to serve extensive developments then being planned, it was decided to source the necessary supply from Ballymore-Eustace. The County Dublin 1971 draft development plan took account of the important decisions required about water supply.

Blanchardstown, north County Dublin, the North-eastern suburbs and North Kildare would be supplied from Leixlip, while the Vartry would serve Wicklow and the coastal belt northwards to Stillorgan. Ballymore-Eustace would be developed to cater for South Kildare, Tallaght, Lucan, Clondalkin and the remainder of the city. A supply from Ballymore-Eustace would replace that of the Vartry to Stillorgan.

In 1954, Dublin Corporation had built a reservoir at Ballycoolen near Blanchardstown to serve the Finglas area. In 1967, Leixlip began supplying Ballycoolen, which provided water for the large Ballymun development. Leixlip, under pressure from its inception, was doubled in output in 1973 to 68,000 cubic metres per day. In the early 1970s, this Works was supplying twelve million gallons per day to the city, and serving most of North Kildare as well as all of North County Dublin. A new reservoir was built at Ballycoolen and more improvements were carried out, including another expansion of Leixlip in 1985. In 2002, the refurbished Leixlip plant, now treating 107,000 cubic metres per day, became the second largest water treatment facility in Ireland, only Ballymore-Eustace being bigger.

The original less than perfect Ballymore Eustace-Rathcoole aqueduct was refurbished in the 1970s. The laying of a 25km specially designed 1620mm diameter pipeline to carry the increased output from Ballymore Eustace to Cookstown was delayed for four years by the wayleave compensation demands of landowners, with knock-on consequences that persisted for several years.

North Dublin Drainage

To overcome a major impediment to development in North Dublin, the North Dublin Drainage Scheme (NDDS) was constructed between 1952 and 1958. Designed to cater for a population of 265,000, an interceptor sewer was laid from Blanchardstown to Howth via Cabra, Glasnevin, Donnycarney, Killester, St. Anne's, Kilbarrack and Sutton to a screen house at Howth. From here the line went in tunnel to its discharge point two major siphons, at Finglas Bridge and Killester, and eight pumping stations. It is a pressure line from Raheny onwards.

Parts of Drumcondra and Clontarf that previously drained to the city centre system were diverted to pumping stations at Clontarf and Vernon Avenue and pumped up to the North Dublin line. Raheny, Baldoyle and Portmarnock all drained to the North Dublin, as did the Santry Valley and North Fringe sewers, which took effluent from Dublin Airport and adjacent developing areas. Numerous premises previously using septic tanks were drained to the North Dublin, which also eliminated any remaining sea outfalls along the north shore of the bay.

One small area at Earlscliffe on the south side of the Howth peninsula, however, continued to drain to the sea. In the 1960s, drainage in parts of Cabra was also diverted to the North Dublin. The North Dublin Drainage scheme was designed by Sewers Department staff and much of the work was carried out by direct labour.

Serving the New Towns

To set out how the Dublin area should develop under the provisions of the 1963 Planning Act, the 1967 Wright report recommended building westwards, with extensive development at Tallaght, Clondalkin, Lucan and Blanchardstown. One of the drainage schemes to facilitate all this was a new sewer serving the areas around the Naas Road, Greenhills and Tallaght. This sewer follows the Dodder Valley eastwards from Templeogue to Clonskea, continuing in two pressure pipes to Nutley Lane and on to the foreshore at Sandymount and so to Ringsend. En route, it intercepts all the areas south of the river except Mount Merrion, the only remaining southern suburb still draining into the city centre system. The Dodder Valley scheme, 16km long, was completed in 1973 at a cost of £3m.

A much larger project was the Greater Dublin Drainage Scheme, started in the early 1970s. Its main purpose was to drain Lucan, Clondalkin and Blanchardstown, relieve flood-prone watercourses in the inner city area and update the main pumping station and treatment plant at Ringsend.

A circular tunnel, 5km long and with an internal diameter of 3.65m – the same as a London Tube – was laid on the south side of the canal from Herberton Bridge to Grand Canal Street. The bore is divided segmentally, carrying both foul and surface water. Along its route, it intercepts foul drainage from Walkinstown, Drimmagh, Crumlin, Terenure and part of the Rathmines and Pembroke areas. It also intercepts the Poddle and other streams, relieving flood-prone areas in Crumlin, Mount Brown, Harold's Cross, Rathmines and the south inner city.

In earlier times, the underdeveloped Blanchardstown area drained to the North Dublin system. Today, it is conveyed in a 1500mm diameter sewer alongside the River Tolka from the Meath-Dublin border to Ashtown. Foul drainage from Clonee, Dunboyne and Ashbourne enters the head of this sewer. At Ashtown, it turns south through Phoenix Park, and, near the Papal Cross, enters a control chamber. It next continues as a twin pressure line across Conyngham Road and Memorial Park and then in tunnel to the trunk sewer at Davitt Road. This sewer flows eastwards to Herberton Bridge, where it enters the Grand Canal tunnel.

From Grand Canal Street, a short tunnel brings surface water, via the Grand Canal Basin, to the Liffey. A second tunnel, 2.74m in diameter, conveys the foul drainage via Bath Avenue, and under the Dodder to Ringsend. The first full-face tunnel-boring machine ever used in Ireland worked on this contract. A short 1500mm culvert linked the now redundant Londonbridge Road pumping station with this tunnel.

Ringsend

The Grand Canal sewer, the eight-foot tunnel of the 1906 scheme and the Rathmines & Pembroke sewer that formerly went to Whitebanks all go into the new Main Lift Pumping Station, commissioned in 1985. Here the sewage is screened and lifted to proceed to the treatment works. The pumping station, which has six pumps with a combined capacity of 323 million gallons per day, was designed to serve an ultimate population of 708,000 people. It has its own stand-by generating station.

Sewage is conveyed from the Main Lift Pumping Station to the treatment works through twin 2.29m diameter pipes. The Treatment Works was built in two stages, each providing six clarifiers, and includes an office block with staff facilities, a laboratory and lecture room. A workshop and stores were also provided.

Ringsend Treatment Works remained largely unaltered from 1906 until the 1970s, when the complete new plant referred to above was built on the opposite side of the road. This Wastewater Treatment Works superseded interim arrangements introduced in the 1970s. The new complex provides primary, secondary and tertiary treatment for rainwater, sewage and other effluents, producing Biofert, a high-grade agricultural fertiliser, Biogas to supply 60% of the plant's energy needs – and clean water in Dublin Bay.

The original 1906 sludge vessel, the *Shamrock*, was replaced in 1958 by *Seamrog II*, which became more and more incapable of dealing with ever increasing loads. A new jetty was built and *Seamrog II* was replaced by the *Sir Joseph Bazalgette* in 1983. Sea dumping ceased in December 1999 and the *Sir Joseph* was sold.

Local Government Re-organisation

A momentous change in the pattern of local government in Dublin City and County was initiated in June 1986. There were extensive boundary changes, which transferred Howth, Sutton and Baldoyle to the County area. The city became responsible for some extra territory along the North Fringe, including Ballymun, Priorswood and Darndale. On the south side, areas beyond the Dodder, e.g. Rathfarnham, went to the county, the Corporation taking over some districts to the southwest. The overall result was the first reduction in the area of the city in Dublin's history.

The final stage of the prolonged process was reached on 1st January 1994, when Dublin County Council ceased to exist and three new local authorities came into being. What was previously North County Dublin became Fingal, which later established its headquarters in Swords. The western portion of the county south of the city area was henceforth South County Dublin, with its County Hall in Tallaght. The south-eastern portion of the erstwhile county and the Borough of Dun Laoghaire were amalgamated

to form Dun Laoghaire-Rathdown County Council, and the former Town Hall at Marine Road, Dun Laoghaire became the County Hall.

When the new councils came into being, minor modifications were made to the boundaries and arrangements made in 1986. On 1st January 2002, Dublin Corporation became Dublin City Council.

The beginning of a new millennium is an obvious point at which to stop this history, especially when addressing those who are interested in heritage and archaeology. But, because history never stops it seems logical to bring the story down to the present.

Dublin Bay, the Environment and Undersea Pipelines

There are several connections between county council sewers, particularly on the south side, and those of the city system. There was also a long and involved history of drainage in Dun Laoghaire that led to a series of major works carried out since the 1970s and is still in progress.

As environmental awareness has become ever more important, national and European laws have set increasingly stricter standards to control pollution and enhance water quality. Rivers are constantly monitored and cleaned, discharges require licences, dumping at sea has ceased and coastal sewage outfalls are being phased out. Two recent major projects contributed enormously to the improvement of water in Dublin Bay, one of our great natural amenities.

In Dun Laoghaire, interceptor sewers were laid and the number of sea outfalls reduced. Since Victorian times, the principal drainage outfall in the former Borough was at the West Pier. A large pumping station – which has won an architectural award – was constructed nearby and, since April 1991, the sewage that formerly went into Dublin Bay, from a population of 55,000 people, has been pumped via an undersea pipeline to the Ringsend Treatment Works. Further drainage works in the Dun Laoghaire are still in progress.

An even bigger scheme commenced in 2001 to eliminate the North Dublin outfall off the Nose of Howth. A 10.5km undersea pipeline, 1.4m in diameter, was laid from Sutton to Ringsend to take the North Dublin sewage to the Treatment Works. An architecturally impressive pumping station was built at Sutton and commissioned in 2003. This station has four 450kW pumps and, like Ringsend, its own standby generators.

An interceptor sewer is being laid from Howth back to Sutton to take residual sewage flows into the Ringsend line. Also flowing to Sutton is the North Fringe sewer. Designed in the 1990s to divert existing flows at various points along the North Dublin conduit and open up new areas for development, it serves Finglas, Poppintree and Ballymun, following the M50 and N32 to Baldoyle.

More Water Supply Improvements

Several improvements have been effected in the water service, the benefits of which are still appreciating. Because 40% of the water produced in 1994 could not be accounted for, the Dublin local authorities, Bray UDC and Wicklow and Kildare County Councils took urgent remedial action. The Dublin Region Water Conservation Project, co-funded by the EU, established a partnership and brought in Anglian Water as its main contractor. By early 2000, more than 16,000 leaks were repaired and daily water savings of 30 million litres achieved. Fewer leaks - down from 42% to 30% by 2000 - led to improved pressure and an end to night-time pressure reduction which had adversely affected 150,000 customers. Water saved also allowed for service to 40,000 new homes and the creation of 5,000 new jobs.

The Ballyboden Water Works had become an increasingly important part of the city system following the incorporation of Rathmines in the city area in 1930. A new treatment plant that was constructed in the 1950s was upgraded in the 1980s. A possible source of extra water is the Owendoher River, which passes within 400 metres of the Works.

Until the early 1990s, all the large arterial watermains coming from Roundwood and Ballymore Eustace underwent pressure reductions in the city area. As a result, they could only service north city properties up to about 30m Malin Head datum, correspondingly roughly with the length of Griffith Avenue. In 1985, work began on a 1200mm main from Cookstown via Ballymount and Walkinstown to Davitt Road, where a connection is made to the Naas Road arterial main coming from Ballymore Eustace. Crossing the Liffey from Bridgefoot Street to Queen Street as two 500mm pipes, the main continues through Church Street and Dorset Street to Lower Drumcondra Road. From here, a 600mm branch goes

up to Home Farm Road and Mobhi Road to the Griffith Avenue extension, where it connects with existing mains

The 800mm main line goes from Drumcondra via Clonliffe Road, reducing to 600mm crossing Annesley Bridge, and connecting with the previously existing Vartry 24-inch main in Fairview Park. The 600mm line follows Clontarf Road and James Larkin Road and goes to Kilbarrack. This final stage of the arterial main, with its subsidiary lines, is now part of the North Fringe Water Supply scheme. Cappagh, Finglas, Ballymun and Donaghmede are all connected to this system, and existing services in the Finglas area are being upgraded.

At Sillogue (Ballymun) there is a new storage reservoir with a water tower and pumps. Strategically located pumping stations are required to increase pressure where gravity mains cannot reach. In Howth, a pumping station supplies a storage reservoir at night, which the low pressure can drain during the day. Additionally, local watermains are being relaid or rehabilitated all over the system.

From 1994 onwards, major works have also been carried out in the Dun Laoghaire area, comprising several contracts. Because of the hills in the former borough, a large new reservoir was built at Killiney. Several smaller installations were modernised, enlarged or replaced. The Dun Laoghaire water scheme, together with the drainage works already referred to, cost €14.3m.

The Docklands Project

The eastwards expansion of Dublin began with the completion of the Custom House in 1791 and the development of the railway system and the modern port in the nineteenth century. Industrial, transport and social change led to much of the older docklands area becoming run down or derelict. Renewal that began in 1987 is proceeding rapidly under the aegis of the Docklands Development Authority. To cater for 5,000 proposed residences and 500,000 sq metres of commercial and industrial units, studies were undertaken to ascertain what water and drainage facilities would be needed. It was found that, while water supply would need only minor improvements, the existing local drainage network could not cope.

Necessary work urgently needed includes a new 2.5m diameter Liffey services tunnel, west of Eastlink Bridge, to carry, inter alia, sewers, a 600mm water main and electricity cables. At Spencer Dock, a large new pumping station will pump effluent via two rising mains in the new tunnel to the Poolbeg Treatment Works. There will also be a large new arterial sewer from East Wall Road to the new pumping station.

Future Water and Drainage

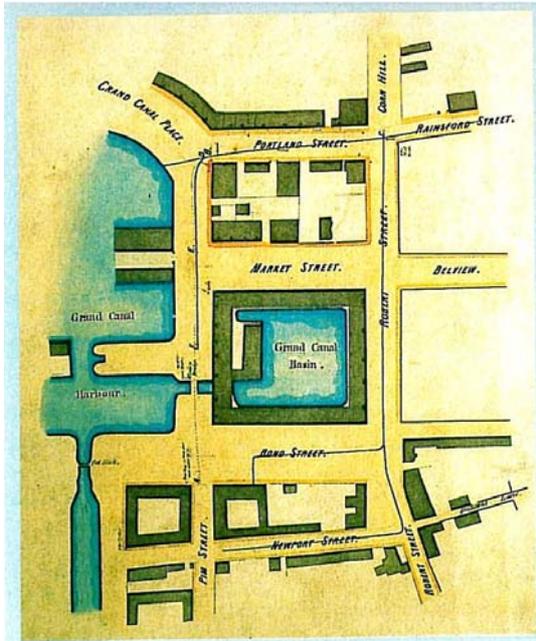
Every day, 500 million litres of water are produced for more than 1.3 million people in the Greater Dublin Region. As the population grows and usage increases, an ever-greater burden is placed on the sources of supply. Further reduction of leakage levels, a major mains rehabilitation programme, expansion to the limit of Ballymore Eustace and Leixlip and investigation of other possible supply sources are among the options being considered. The former Rathmines Works at Gallanstown on the Grand Canal will be modernised and brought back into service.

Set up in 2001, the Greater Dublin Strategic Drainage Study covers a core area covering all of County Dublin, Northeast Kildare, East Meath and part of Northeast Wicklow. Dublin City Council is the contracting authority acting on behalf of all the local authorities in the area, 150,000 hectares in extent and with a population of 1.3 million people. The study, which enjoys the benefits of computer based hydraulic modelling and Geographical Information systems, will recommend the drainage infrastructure needed up to 2031.

In Conclusion

Our water service has been with us for 763 years, an organised drainage system since 1774. This Republic has long been notorious for the selective interpretation of what constitutes our heritage and as a result, little has survived of what would until recently have been officially regarded as urban or alien. Happily, expanding cultural boundaries now encourage greater respect for all our worthwhile past, and much of the credit for this is due to architects, archaeologists, engineers, together with the many historical and heritage groups who work hard to make reality of the cliché of ensuring the future of the past. Items that survived fortuitously in a twilight zone are now assured of better prospects. Much of this welcome change is due to the Heritage Council

which, since its establishment as a statutory body more than ten years ago, has positively supported the documentation and preservation of engineering and industrial relics. As one of those privileged to work in one of its programmes, I would like to conclude by acknowledging the work of the Council.



ILLUSTRATIONS

Front: Water Basin uncovered at Forbes Lane, 2006. Photo by Archaeologist

Left Blessington Street Basin

Below: Cross Sections from Drawing of Sewer in Hardwicke Street

