



Filter Beds



Roundwood Reservoir South Lake



Filter Beds

Dublin Water...

Solving Dublin's Drinking Problems

Dublin has had an organised system for water supply for almost 750 years. WATER is as essential to life as the air we breathe. A wholesome supply is a first requirement for healthy living; 80% of all sickness and disease being caused by polluted water, which kills twenty million people every year, worldwide.

Traditionally, 99.5% of the world's water could not be used, as it is locked up in glaciers and ice sheets, or is saline. Most of the remaining water is present in rocks as groundwater and less than 0.01% is present in rivers and lakes. In many parts of the world where rivers and lakes are either absent or polluted, ground water is often the only source of fresh water. In Ireland about 25% of the water we use comes from groundwater but this figure will undoubtedly rise as we become more developed.

The citizens of Dublin have been fortunate in always having an abundant and safe water supply. Michael Corcoran's book "Our Good Health", published in 2005 by Dublin City Council's Library and Archive Service (ISBN 0 946841 77 2), gives a comprehensive and unique insight into the history of Dublin's water supply and drainage services.

The total production of drinking water for the Dublin Region at present is on average 540 million litres per day. Dublin City Council produces approximately 375 million litres per day Fingal County Council produces the remainder of the total.

Water is supplied to the Dublin City consumers through a network of pipes over 2100 km in length and ranging in age from modern to over 100 years old. Pipe sizes range from 53mm (2") to 1600 mm (60") in size. The Water Services Division works to ensure

a constant supply of safe drinking water at adequate pressure to meet all its consumers' needs.

Through the Centuries

In medieval times Dublin City was only 20 ha. in extent, and was built on the ridge of high ground between present-day Thomas Street and Dame Street, near the confluence of the Liffey and the Poddle Rivers. The Poddle served the needs of the early settlers. The Liffey was tidal far to the west of the city, and was therefore unusable as a source of water. By the 13th century the supply available was proving inadequate, and the City Sheriff was mandated in 1244 to improve the supply. An agreement was made with the Priory of St. Thomas, which owned a weir on the Dodder at Balrothery, to divert water from the Dodder to the Poddle. Under this agreement the flow in the transfer channel would be increased by raising the weir and doing certain other works, for which a fine of 5 marks and an annual rent of 1 mark was to be paid to the monks.

The increased flow of the Poddle was divided at a point just south of present day Mount Argus by a construction known as the Tongue, one-third of its waters being brought in a canal around the Liberties to a cistern near the present Waterworks Headquarters at Marrowbone Lane. From here the water was taken in an open channel along Thomas Street, and then by the 'high pipe' wooden troughs and leaden pipes - to a public 'conduit' or fountain near Christchurch.

About the year 1670, the old cistern at the terminus of the City Watercourse was replaced by a reservoir known as the City Basin, near St. James Gate. From Dolphin's Barn to the Basin,

the watercourse was carried on a rampart of earth and stone, from which the area came to be known as 'The Back of the Pipes'.

There are numerous references in the ancient records of the city concerning the upkeep of these works, and in relation to litigation and grants of water to individuals. One of the earliest is a request from King Henry III in 1245 for a supply of water for the King's Hall. The lead pipe which carried this supply was uncovered in Castle Street in 1787. The rebel followers of Silken Thomas in 1534, according to Hollinshed's Chronicles, "cut the pipes of the conduits whereby (the city) should be destitute of fresh water".

In 1721 the Corporation reconstructed and raised the level of the City basin at St. James Gate. A 250mm lead pipe was laid to James Street from the Basin, and from this three lead pipes of 150mm diameter were laid into the city with branches distributing water about ninety streets. This was the final stage of the development of the Poddle supply.

The Balrothery Weir was reconstructed by Andrew Coffey in the early years of the 19th century, and the present sluice gates and bypass channels date from then.

By 1735 the supply from the Poddle could no longer meet the needs of the growing city. The Corporation acquired the mills and weirs at Islandbridge and constructed a 'powerful water-engine' to deliver water through two 150mm wooden water mains to the north city, and thereby relieve the supply situation south of the Liffey. No details remain of this interesting installation which, together with the City Basin, served a network of one hundred and eighty-five streets for about forty years.

Canal Supplies

With the completion of the Grand Canal, fed by the Moell River near Straffan and later the waters of the Pollardstown Fen, a new course of supply became available to the Corporation. The canal passed conveniently just to the south of the City Basin, to which water could be admitted by a sluice, as a supplementary supply. Later, as the canal was extended to Ringsend around the south city, a new basin was constructed at Portobello for the south-eastern area of the city. From here a 300mm main was laid in 1880 by Lord Ardilaun, at his own expense, to supply the water ie Stephen's Green and this is still in service.

A supply was taken in 1814 to a new basin at Blessington Street to service the north city area. This continued to supply the distillers at Smithfield until they ceased operations some years ago.

This was the era of wooden water mains, which were usually of elm or fir, and specimens of these still survive. In 1809 an Act of Parliament, known as the Metal Mains Act, authorised the Corporation to substitute iron pipes for the old wooden pipes and to levy a rate to pay for this work, which was completed during the following 10 years.

The Canal supplies were necessarily at low pressure due to the elevation of the basins. They gave water at street level, but could not reach the houses in the higher and outlying portions of the city. The concept of internal plumbing was still unknown, and water was simply carried from the street level to the point of use. A water supply continues to be drawn from the Grand Canal, formerly for the various brewers and distillers, but later solely for Messrs. Guinness.

The Vartry Supply

It had gradually come to be recognised that the water supply from the canals was inadequate and was also unsafe. Indeed, Dublin had been subject to periodic visitations of waterborne disease. A Royal Commissioner, appointed in 1860 to review the state of Dublin's Water supply concluded that the Vartry was the best, albeit the most expensive source of water for the city. The project was promoted vigorously by the Chairman of the Waterworks committee, Sir John Gray, who has been deservedly honoured by a statue in O'Connell Street. The scheme was an outstanding success.

The Vartry Waterworks comprised an earthen dam 20m high, retaining 11 million m³ of water, slow sand filters and a clear

water basin. The water was then conveyed through a 4km long tunnel and then by a 84 cm cast-iron main to a large open service reservoir at Stillorgan. This scheme could deliver up to 85,000m³ daily of pure water at high pressure to the city. The increased supply coincided with the development of internal plumbing systems, waterborne sanitation and the sewerage of the city, which brought modern sanitation and water supply to the more prosperous of Dublin citizens.

The system was further developed with the construction of increased storage at Roundwood, the completion of the Gray Reservoir at Stillorgan in 1923 and finally the construction of 4 additional filters at Roundwood in the early 1930's.

The Dodder Supply

Dissatisfaction in Rathmines with its supply of poor quality hard water at low pressure from the Grand Canal prompted the Town Commissioners to find a better supply. Although Dublin Corporation was anxious to sell surplus water to Rathmines, the Commissioners decided to obtain a supply from the Dublin mountains. A reservoir was constructed at Bohernabreena to receive the relatively clear water from the local catchments, with by-pass channel for the peat-stained waters of the Dodder River. A second reservoir was constructed to retain river water for release during dry periods, as compensation for the many mills then dependent on water power. The supply was piped to a water treatment plant at Ballyboden, and thence to the township.

The Poulaphuca Supply

The rapid expansion of Dublin in the 1930's increased the demand for water. When the ESB began to harness the Liffey at Poulaphuca the Corporation acquired the right to a supply of 90,000 m³ per day, thereby doubling its water resources. The works were completed under the difficult conditions caused by the advent of World War 2. Because of the high colour of the water it was necessary to resort to physico-chemical treatment to clarify and sterilise the water. A notable feature of this scheme was the 23km (14 mile) long aqueduct, constructed of cast-in-situ concrete, employed to carry the water to a reservoir at Saggart en route to Dublin. Another innovation in this scheme was the use of bitumen-lined and sheathed steel mains, which are still in excellent condition.

The North Regional Water Supply

Dublin County Council had a long-standing ambition to provide piped water for the North County villages and rural area, and to replace the obsolete installations at Swords, Rush, Donabate, Balbriggan and Skerries, provision was made during the construction of the Leixlip Dam by the ESB for a supply from the reservoir for Dublin County Council. Construction of the treatment works and pumping plant commenced in 1966, and a 10 km steel rising main and a 23,000 M³ service reservoir was constructed at Ballycoolen.

A basic trunk main and service reservoir system was first provided and the system later developed until virtually every road in the area was covered by the mid-seventies.

Water Shortage

For at least forty years the water supply of Dublin has been inadequate in some respects. Investment in new works has always tended to lag behind increasing water demand. The distribution system was extended on an ad hoc basis, without corresponding provision for developing the source works and trunk mains. However the basic water resources of the city in the storage reservoirs had always been adequate.

Recent Developments

The Greater Dublin Water Supply Strategic Study.

The emphasis on long-range planning had been introduced with the Development Plans required by the Planning Acts. These Development Plans were of enormous assistance in the forward planning of the water supply of the Metropolitan Region.

Nevertheless as a result of the rapid growth in population and commercial and industrial development over the last quarter of the 20th century coupled with the long lead-in time for new works, demand constantly outstripped supply, even though the delivery of water doubled over a relatively brief period of years.

This placed major strains on the city's water supply.

The Strategic Study, commissioned by the Department of the Environment, published in 1996 and reviewed in 2000, was set up to determine the projected water demands for the Greater Dublin Area up to the year 2031 and to identify future drinking water storage requirements for the Region.

Dublin Region Major Water Sources Project

Dublin City Council's Water Services Division set out an investment programme initially up to 2016, as part of its planning for the future drinking water needs of a growing population, which post 2016, is expected to be in excess of 2 million people.

Sensible long term planning is being undertaken to ensure that in 10 years time the Region will have sufficient drinking water, without water shortages.

It is now investing in water conservation with millions of euro being spent on;

- Repairing and replacing old water pipes, reducing leakage of treated water from the system and improving flow and water pressure.
- * Promoting water conservation by all consumers under the banner of "Water is Precious- Lets Conserve it". This includes a schools programme which seeks to educate children of the importance of this scarce resource by involving them in an interactive way in measuring and hopefully reducing water consumption in their schools.
- * Encouraging existing consumers, planners, designers and developers to consider the use of rainwater or greywater for toilet flushing (which accounts for about 30% of domestic water usage) or garden use in the interests of water conservation.
- Building new pipelines, along the North Fringe to ensure better water distribution and pressure, while providing infrastructure for future development.
- Provision of a new Water Tower and reservoir at Sillogue to hold 35 m litres of water ensuring that an adequate water reserve is on hand to service the area.
- Provision of a wastewater treatment works providing sustainable water treatment and pasteurised by products for use in agriculture.

There are a number of proposals regarding how to plan for increased water supplies to meet this future need,

1. One being to pipe water from the Shannon, which will then be treated. or
2. Desalination of sea water, on which the technology is advancing year on year.

It is currently at the study phase of both these proposals and there isn't, and won't be any decisions on how the City is going to meet this future demand until the study is complete in mid 2008.

As more information is obtained from these studies, which includes identifying



supply and demand, detailed environmental appraisal, economic assessment, tourism, habitats and existing uses a full evaluation of all the information will result in a proposal. All of the interest groups will be engaged in a full consultation process before any proposals are finalised.

Covered Reservoirs

The 1996 General des Eaux / M.C.O'Sullivan "Greater Dublin Water Supply Strategic Development Plan" noted that open storage of treated water was undesirable, and recommended that an alternative to open storage be implemented.

To comply with the this recommendation in 2006/7 the City Council carried out works at Vartry that included the construction of a Reinforced Concrete Covered Service Reservoir with a total capacity of 13,000 cubic metres. The construction of two Reinforced Concrete Slow Sand Filters Beds. This work was completed without interrupting the supply output from the plant. Also during that time the opportunity was taken to construct a hydro electricity generating facility at the works that will provide sufficient sustainable energy to operate the plant and leave spare capacity for sale to the national power grid.

Plans are also in preparation to provide covered treated water storage capacity at Stillorgan Reservoir and to construct additional covered storage at Saggart.

Conclusion

Dublin City Council is undertaking sensible long term planning and doing it's best to ensure that in 2031 the Region will have sufficient drinking water without water shortages.

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Water Treatment

It is usually necessary to subject natural waters to some form of treatment to make them potable and to meet the drinking water standards now required by an EC directive. Groundwater is often of very high purity and may only require precautionary disinfecting. Surface waters almost always contain impurities which can be removed by slow passage through a bed of fine sand about 1m deep using a process of Slow Sand Filtration where organisms which grow on the sand surface remove bacteria and viruses, and can give a filtrate of very high quality. The process is attractive because it employs natural agencies, is simple, very reliable and has the attraction that no chemical reagents are employed. Usually it is followed by chlorination as a second line of defence and as a precaution against after contamination in the mains system. This is the process employed by Dublin City Council treats water at Vartry. Unfortunately not all water sources can meet the directive's requirements with this form of treatment, because slow sand filtration is unsuited to waters which are turbid (muddy) and cannot remove colour.

Waters with high colour and/or heavy turbidity can be easily clarified by the addition of coagulants, which cause the impurities to aggregate into flocs which can be separated from the water, removing not only the impurities but also the chemicals applied in the treatment process. There are a number of variants of this process related to the design of the separation units. After clarification the water may still contain bacteria and viruses, and must be disinfected, usually by a small dose of chlorine. As stated above, a residue of chlorine must be maintained in the distribution system to counter any accidental alter-contamination. Occasionally this trace dose can give rise to complaints about bad tastes in the water. Dublin City Council utilises this Rapid Gravity Filtration system at its plants in Ballymore Eustace.

Very heavily contaminated waters may require multistage treatment to remove odours and tastes or specific contaminants such as nitrates or other residues of upstream contamination. These processes may involve the use of ozone for oxidation, activated carbon for adsorption of organics, aeration for the removal of or sulphur, etc., etc.