

£100 million Belfast Sewers Project

Providing modern sewerage system for city

By Bill Gowdy

The city of Belfast, Northern Ireland, received a major boost in September 2007 when work began on the construction of the £100 million tunnel project, which will provide Belfast with a modern sewerage system within three years. This project is an integral and final part of Northern Ireland Water's innovative Belfast Sewers Project - one of the biggest and most important infrastructure investments in the city, involving work to upgrade the existing sewer networks and the construction of a large diameter drainage tunnel to increase stormwater capacity. One of the biggest infrastructure investments in the UK, the Belfast Sewers Project has used a combination of new technology and innovative environmental methods, such as trenchless or 'No-Dig' technology to replace the outdated sewerage system and at the same time cause as little disruption as possible to city life.



Belfast Sewer Project; View of the tunnel shaft at Whitla Street

courtesy Northern Ireland Water

Upgrading

The contract to upgrade the sewer network started in 2005. There are approximately 1,800km of sewers covering a catchment area of 42sq km. The older central area of Belfast is served by two large diameter brick sewers dating from 1888, and a third concrete sewer was commissioned in the 1970s.

The implementation of this project will result in the closure of a significant number of the existing combined sewer overflows, which will reduce the pollutant load from the sewerage system on the River Lagan and its tributaries by 85% of present levels.

Infrastructure services *Morgan Est and Farrans Construction Ltd* have joined forces to form a **fully integrated Joint Venture to carry out the construction works of the £100m Belfast Sewers Project.** The respective skills and knowledge of both companies will enable the JV to deliver the project by 2009. The contractors have also

worked closely with Atkins Consultants, the designated Project Managers, throughout the project.

Construction of purpose built terminal pumping station

The Terminal Pumping Station (TPS) is the last shaft in a series of 24 shafts and tunnels collecting storm water from Combined Storm Overflows around Belfast. **The TPS is capable of pumping up to 4,000 gallons of water per second and is a key part in Northern Ireland Water's Stormwater Management Works.**

During even the heaviest storms the TPS will effectively and safely govern the stormwater from the sewers, screening the flush to ensure that materials are correctly pumped to the Wastewater Treatment Works in Duncrue Street or discharged via a diffuser into the Herdman Channel

This will lead to a significant reduction of pollution from non

bio-degradable materials that will ease the burden on the sewer system, resolving issues of flooding in Belfast.

Work on the TPS started on site in November 2006 and is expected to be complete by March 2009.

Construction of new sewer tunnels

The new Belfast Sewers tunnel, which is the final part of the Belfast Sewers Project will weave its way across the city. The tunnel will be about ten kilometres in length and up to four metres in diameter and in places it will be 30m below the ground. It will start at Cromac Steet and end at the pumping station at Belfast Wastewater Treatment Works, Duncrue Street. Tributary tunnels will also join the main tunnel at various points. These tributary tunnels will start at Glenmachan Street, Park Road and Queens Quay. A series of vertical shafts will be constructed along the route of the tunnel to provide stormwater connections and access to the system for inspection and maintenance.

The shafts will range in size from small 1.6m internal diameter access shafts, to the large 37m diameter 30m deep terminal pumping station which is presently under construction at the Belfast WwTW. The main 4m internal diameter tunnel from Duncrue Street to Cromac Street, some 30m below ground, will be constructed over three years and is due to be completed in 2009.

Tunnel Boring Machine

2007 saw the arrival of a 'friendly giant' as the Belfast Sewers Project's massive tunnel boring machine arrived in the city.

The Tunnel Boring Machine (TBM) is a 9m long colossus which pulls over 250 tonnes of support equipment and machinery as it works its way through the soil. The business end of the machine is the cutter head. Equipped with ripper teeth and roller cutters it can power through even the toughest of compacted sediment and grind to bits any boulders that get in its path. Advancing 1.2m at a time the TBM stops so that a ring of tunnel lining can be built. Six precision, pre-cast concrete segments fit together to form a 1.2m wide ring with an internal diameter of 4m. The tunnel ring segments are locked and bolted together, and a special grout is added to the cavity to support the tunnel lining and stabilise the soil. Using a combination of laser guidance and onboard computer controls, the machine shows operators its exact location in a 3D environment, ensuring that the TBM and the Belfast Sewer Project stay on a safe, precise and steady track.

This project will bring significant benefits to Belfast, providing a modern effective sewerage system, and reducing the risk of flooding. ■

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