Water Mains Rehabilitation Programme

Northern Ireland Water's £80m investment to upgrade over 1,000km of water mains across Northern Ireland

by Keith Haslett BEng CEng MICE

The existing water mains infrastructure in Northern Ireland consists of 26,500 kilometres of pipes supplying 625 million litres of water per day to 1.8 million consumers in households, farms and businesses. While consumers are served well by the existing infrastructure, many parts of the network are well over 40 years old. Lack of investment over the last 30 years has led to significant parts of the system becoming defective, leading to bursts, leaks, water quality issues and pressure problems. Large sections of the antiquated system are made up of unlined iron water mains, which are in need of replacement.

A2 Belfast to Bangor dual carriageway night time works - Courtesy of NI Water

Background

In 2010, Northern Ireland Water (NI Water) embarked on its Water Mains Rehabilitation Programme, an extensive 5 year project aimed at upgrading a range of water mains across both rural and urban areas of Northern Ireland. The main objective of the programme was to improve the performance of the water mains and provide a more reliable and secure water supply system.

The Water Mains Rehabilitation Programme

The three year price control period of PC10 from 2010-2013, required NI Water to deliver 900km of water mains consisting of various diameters at a project budget of £80m. This PC10 programme represented part of an estimated £250m investment over the next eight year period aimed at improving the water distribution system. The PC10 outcome demonstrated that the project outperformed on its targets by completing over 1,000km for £80m.

The project comprised of a series of individual schemes, which will collectively provide a more reliable and secure water supply system in Northern Ireland that meets the increasingly stringent standards set by the European Union.

Needs and options stage

The nature and severity of any problems with the water mains in a rehabilitation zone were identified during detailed zonal studies (DZS). The DZS facilitates the assessment of the performance of the water network against a set of 'Key Performance Indicators' and comprised of two main components, the Needs Report and the Options Report. The Needs Report summarises the results of the assessment of the existing network in terms of structural condition; hydraulic performance; water quality and operational performance. The Options Report identifies the construction work that should be undertaken to address the problems identified in the Needs Report.

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The enabling stage

The enabling stage involves one of the framework contractors completing site investigatory works on an allocated work package to identify the risks associated with each water main scheme. A number of these risks include constraints due to ground conditions, existing utility services and traffic management issues.

The site investigation works allow optimisation on the best construction technique for the installation of the water main, in order to achieve the best value for money. On completion of the investigatory works, a decision panel confirms the installation techniques in agreement with the project management team and the operational staff from NI Water. On agreement, the contractor will then confirm the project budget for approval by the NI Water project team to progress forward to the construction stage.

The construction stage

The NEC 3 Option B contract is undertaken by a consortium of Northern Ireland based contractors who have the extensive design, civil engineering and mechanical and electrical experience along with invaluable local supply links and geographical knowledge required to successfully execute the scheme.

The two appointed contractors are Lagan Construction and Farrans Construction, and the delivery mechanism is based on design and build with both contractors having nominated designers to support the programme of works. The contractors work alongside a dedicated project management team comprising specialists from Atkins Consultants and NI Water, who manage the successful delivery of the project across Northern Ireland.

The project also has dedicated NI Water operational staff from the Customer Service Delivery Directorate who assist in managing the interface between the construction works and continual supply of water to the customers. The NI Water staff also work closely with the contractors to ensure the proposed construction methodologies are appropriate for the short and long term needs of the water supply network.

The rehabilitation programme ensures a large emphasis is placed on providing high levels of customer care, which includes the minimisation of supply disruptions and general disruption during the works. A customer care specification has been developed especially for these works and each contractor has a dedicated Customer Care Manager due to the large number of pipe laying squads on the ground.

Customer letter drops with specific project leaflets are circulated within the vicinity of each new works area to ensure that all residents within the area are aware of when and why the work is taking place.

In addition, the project team ensures early stakeholder involvement on a regular basis with politicians, local councils, businesses, community groups and statutory authorities including Roads Service and other utility companies.

The project team developed a bespoke cost management system (CMS) to provide accurate data for analysing costs on each water main scheme to ensure value for money is achieved by NI Water. CMS is used on a daily basis by both the contractors and NI Water to upload and approve all site measurements for payment purposes. This data is also used to provide accurate reports on outputs with the Northern Ireland Authority for Utility Regulation.

Case Study: A2 Belfast to Bangor Dual Carriageway

As part of the Water Mains Rehabilitation Programme, A2 Belfast to Bangor Dual Carriageway project represented a £2m investment to improve and upgrade the water mains network in the North Down area of Northern Ireland.

Danny Kennedy (Minister for Department of Regional Development) and Trevor Haslett (NI Water Chief Executive) on site in North Belfast marking the 1,000km milestone on the framework - Courtesy of NI Water

The Belfast to Bangor Dual Carriageway is one of the busiest arterial roads in Northern Ireland and required consultation between NI Water and the key stakeholders at an early stage. The programme of consultation with the local community, businesses and schools was completed well in advance of the work, including a presentation to North Down Borough Councillors and regular meetings with all local representatives and the local chamber of commerce.

The consultation process was also supported by regular customer letter drops and press releases to the local media and traffic bulletins on the radio. The feedback led to all the works being completed at night time during weekends only to minimise the disruption to commuters from the North Down area to Belfast on a daily basis.

The works along the A2 Bangor/Belfast Dual Carriageway took place between the hours of 7pm on a Friday and 7am on a Monday, over 20 consecutive weekends and involved continuous shifts of pipelaying squads to maximise productivity during the road closures, in order to avoid disruption to weekday traffic flow. Traffic lane restrictions were required to facilitate the works and two-way traffic was maintained at all times.

The A2 Belfast to Bangor project was successfully completed ahead of schedule, with minimal disruption to road users in the area. The scheme was also commended by local elected representatives.

Progress to date

The 3 year PC10 programme has invested over £80m up to the end March 2013 and delivered over 1,000km of water mains across Northern Ireland, exceeding the original target of 900km agreed with the Regulator.

The installation techniques include open cut, directional drilling, pipe-bursting, slip-lining and semi-structural lining. The trenchless technologies utilised account for 75% of the water mains replaced or rehabilitated.

The two year PC13 delivery programme will continue to invest a further £51m and deliver an estimated 445km of water mains.

Conclusions

The water mains rehabilitation programme will bring many benefits, including increased compliance with the Water Quality (Water Supply) Regulations Northern Ireland, increased operational reliability and flexibility, a reduction in the number of interruptions to customer supplies due to emergency repairs to burst water mains, reduced leakage levels and it will facilitate social and economic development across Northern Ireland.

The Editor & Publishers would like to thank Keith Haslett, Head of Water Capital Procurement 2 with Northern Ireland Water, for providing the above article for publication.

Work continues on the Watermains Improvement Programme in Carrickfergus, Northern Ireland - August 2013 - Courtesy of NI Water


Watermains Improvement Work at the North Road, East Belfast Courtesy of NI Water


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