

# Dunore to Hydepark Trunk Main Scheme

## major new pipeline commissioned early in Northern Ireland

**I**n 2006, one of Northern Ireland Water's (NIW) key capital works projects was the replacement of its old Dunore Pumping Main - a supply system responsible for the delivery of pure wholesome water to around 25% of its customers. Representing an investment of £24 million, NIW in partnership with the Murphy Lagan JV, achieved something of a record with the contract, laying all of the pipes along a 18km route in less than six months and commissioning the essential main one month ahead of schedule.



*courtesy Northern Ireland Water*

### Project background

Water is delivered to Belfast's 700,000 population from two sources - Lough Neagh (northern source) and the Silent Valley (southern source). At Lough Neagh the water is treated at Dunore Water Treatment Works (Northern Ireland's largest treatment plant) before being transferred to Hydepark Service Reservoir in north Belfast for distribution throughout the city and beyond. Up until December 2006, on leaving the works, water travelled to the reservoir's four tanks along a 48" diameter pre-stressed concrete pipeline known as the Dunore Pumping Main. This important transmission system, which represented one of two essential large diameter trunk mains in Northern Ireland, transferred between 130 and 150 million litres of water a day.

### Need for new pipeline

Commissioned in the late 1960s by the Belfast Water Commission, the Dunore Pumping Main, by the early 2000s, was deemed to be reaching the end of its useful life. An increasing number of the 3,500 joints on the old 17km line were proving to be ineffective with more and more leakage and on occasions bursts occurring.

As part of the extensive investment being made to rationalise and upgrade the water infrastructure throughout the Northern Ireland, NIW proposed to lay a new pipeline to safeguard the provision of

high quality drinking water to around 400,000 people in Antrim and the greater Belfast area.

### Options considered

Before deciding on a completely new pipeline however, NIW considered different options to upgrade the Dunore Pumping Main. Refurbishment or relining of the pipe was ruled out, given that the existing line could not be taken out of service for more than 18 hours without affecting consumer supply. The more robust, long term solution identified was the complete replacement of the old concrete system with a modern new pressurised pipe and the subsequent abandonment of the old 48 inch main.

### Route assessment

Ahead of contract award and working closely with their preferred bidders, Murphy Lagan JV, NIW determined the route of the new pipeline taking into account extensive engineering, environmental and economic criteria. The best route for the new pipe was deemed to be one which followed a 110m contour, mainly along the path of the old main.

This meant that the majority of pipes (16km) would be laid in agricultural land with the remainder through industrial and Belfast City Council-owned grounds. In statistical terms, the pipeline was

destined to cross 120 fields, 23 roads, four rivers, three playing fields and one golf course. To ensure minimal disruption to road users and the public in general, NIW and its contracting partners planned from the outset to use innovative trenchless techniques to carry out virtually all major road and river crossings.,

### **The Project**

The Dunore to HydePark Trunk Main Scheme, known throughout its contract life as the D2H project, was awarded in May 2006 to the Murphy Lagan Joint Venture as an NEC option C cost reimbursable contract. Supporting the JV in a civil design capacity was Atkins based in the regional office in Belfast. This was the first time that London based John Murphy & Sons had joined forces with Belfast company Lagan Construction and having gone through a detailed design development phase, the JV was able to hit the ground running immediately.

In less than four months the contractors had completed all pipe laying in the agricultural section of the project - a total of 1,270 pipes along a distance of 16.5km. In preparation for carrying out this work, and within this short timescale, the team had also successfully erected temporary fencing, implemented pre-construction drainage, stripped topsoil and carried out archaeological and environmental surveys along the entire 18km route,

### **Land liaison & Communications**

In a bid to communicate effectively with key stakeholders, both NIW and Murphy Lagan appointed land liaison officers to deal specifically with all landowner queries. During the design development phase, public information nights and landowner events were held to publicise exactly what would be involved in the scheme and presentations were given to councils affected by the work.

A detailed environmental statement was also prepared for the scheme to ensure that all construction work would take due regard for the environmental sensitivities of the area. Many aspects were considered in preparation of the statement including ecology, air quality, noise, flora and fauna, traffic issues water quality, drainage, archaeology, cultural heritage and visual impact.

### **Sympathetic approach**

While the EIA addressed many of the environmental factors surrounding the major pipeline scheme, it was recognised that a project of this size would undoubtedly have some impact on the environment. From the outset, measures were set in place to keep this to a minimum and promote a more environmentally friendly approach to construction. For example, as well as the myriad of trenchless technology techniques undertaken, all excavated rock was reused where possible and before construction start, lengthy measures were taken to deter birds from making their way to nest in hedges affected by the pipeline route. Archaeologists were also appointed during the stripping of topsoil to ensure that any archaeological finds or features were noted and the relevant authorities informed.

### **Challenges faced**

While the majority of the pipes were laid in agricultural land it wasn't always soft ground that the contractors were faced with. Rock was a frequent find along the route and targeted drilling and blasting had to be employed to allow the pipeline to make its way through. Further rock was encountered during the final stretch of the D2H project which involved laying around 800m of pipes within a huge industrial business complex. To ensure minimum disruption to the public, trenchless pipelaying methods such as pipejacking were undertaken which allowed roads to remain operational.

What made the project even more challenging was the fact that at numerous points the new line crossed underneath the old main which was still in operation and extremely vulnerable to even the slightest

surges in pressure. Maintaining a constant flow and ensuring no breach of the old main were of the highest priority for the contract team.

### **Commissioning**

Having completed all cleaning and testing work, the new Dunore to HydePark Trunk Main was put successfully into service in December 2006 - less than eight months from contract start. Commenting on the commissioning of the new water main, NIW Chief Executive, Katharine Bryan said: "The Dunore to HydePark Trunk Main Scheme represents an integral part of NIW's multi-million pound investment programme to improve and sustain the delivery of high quality drinking water across Northern Ireland. The completion of this modern pipeline safeguards one of our most vital water supply systems and being of a highly robust design, it will have a significant impact on NIW meeting its leakage reduction targets."

With the pipeline operating successfully, the final stage of the project - the reinstatement works got underway in Spring 2007. This phase of the programme included the replacement of hedgerows and reinstatement of stone ditches; soil rotavation and removal by hand of all large stones before seeding out the entire 18km long strip. Extensive drainage was also implemented to ensure grounds were returned in as good, if not improved state.

### **Benefits**

With the pipeline crossing two of the fairways of the local golf course, the club has benefited from the redesign of one of the holes making a longer fairway and an upgrade from a par 3 to par 4. Reinstatement at both the golf course and council playing fields have involved precision landscaping with ongoing consultation with key stakeholders to ensure the best possible result has been achieved to the benefit of all involved.

Ultimately, the new Dunore to HydePark Trunk Main has safeguarded one of Northern Ireland's most vital supply systems, thereby guaranteeing the provision of pure wholesome water for many generations to come. Being of much more sophisticated design the new pipeline will greatly reduce the risk of flooding and will offer NIW increased flexibility to serve a greater number of customers during prolonged dry weather.

Around 1.5 tones of water now flow every second along this modern piece of infrastructure, conveying up to 150 million litres of fresh drinking water a day to over one quarter of Northern Ireland's population.

**Summary of main facts & figures relating to the D2H scheme**  
**18km of 1200mm (4ft) diameter, high specification pipeline, capable of delivering 180 million litres of water a day.**  
**High quality water supply safeguarded for around 400,000 consumers. New pipe will have 1,350 welds.**  
**300,000 tones of material excavated and reused where possible**  
**More than 150 personnel employed during height of construction phase.**  
**120 fields crossed;**  
**22 roads crossed (majority by trenchless techniques)**  
**4 rivers crossed (majority by trenchless techniques)**  
**1 railway crossed by (trenchless techniques)**  
**3 playing fields crossed**  
**1 golf course crossed;**  
**2 dedicated land liaison officers;**  
**Experienced archaeologists appointed during stripping .topsoil. ■**

**Note:** *The editor and publishers wish to thank Northern Ireland Water for preparing the above article.*



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