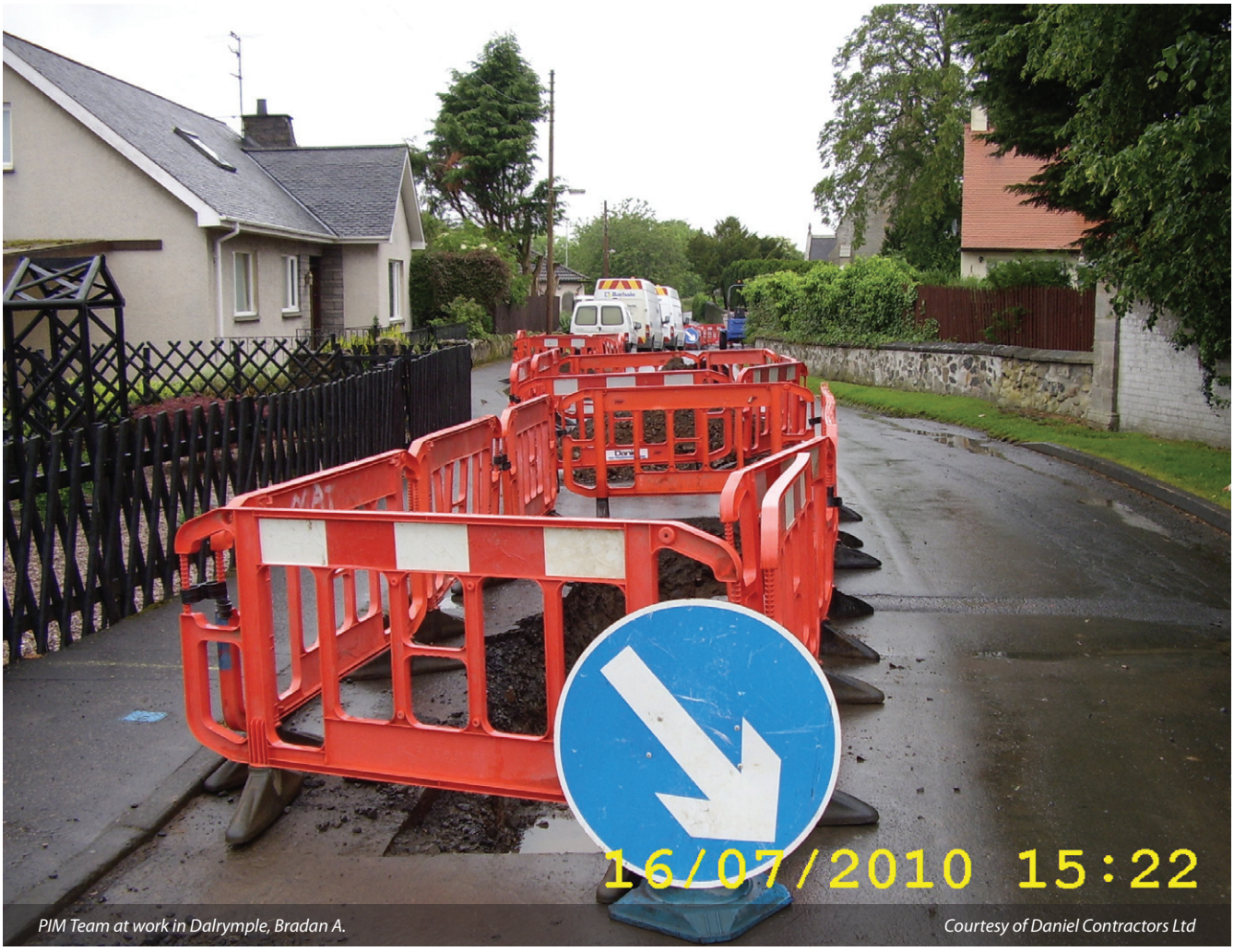
DW5 (Ayrshire) Water Mains Rehabilitation

quality enhancements to 1,200km of water mains in Ayrshire through a variety of intervention techniques

by Andrew Banks

The Water Industry Commission for Scotland (WCIS) is funding Scottish Water to deliver a £400m per annum Capital Investment programme following the publication of its Strategic Review of Charges 2010 (SR10). Of that funding, £140 million has been allocated to Water Mains Rehabilitation work (DW5), to reduce the risk of water quality being degraded due to the condition of the distribution system, principally because of the presence of Iron and Manganese deposits. The DW5 Project commenced in April 2010, and will deliver a '*length of main improved to meet the required standard*' as agreed with the Drinking Water Quality Regulator (DWQR). The programme of works will achieve this objective by rehabilitating the known problem assets as identified from the Distribution Operation and Maintenance Strategy (DOMS) Level 2b Water Quality Zonal Needs Report, and as confirmed by the Capex 2 investigation. The Regulatory Supply Zones have been disaggregated to sub-zones, which are generally at DMA (District Meter Area), but some at WSZ (Water Supply Zone). This Primary Output is listed as sub-zone level.



PIM Team at work in Dalrymple, Bradan A. *Courtesy of Daniel Contractors Ltd*

The DW5 Programme of works has been allocated by Scottish Water into four operational areas, with Barhale Construction delivering the rehabilitation works in Ayrshire. The work is being carried out under an NEC 3 Option C Contract. Phase 1 of the programme is to deliver over 1,200km of mains rehabilitation in 5 (No.) projects - Bradan A, Bradan B, Afton, Douglieill and Kaim Lochwinnoch.

The quality enhancements are being delivered by a variety of intervention techniques following design assessment of the condition of the water main. This is achieved principally by lining of existing unlined metallic water mains with a polyurethane liner, or by utilising cleaning techniques to clear existing lined, plastic or asbestos cement mains through flushing, swabbing or air scouring.

During the initial design or site investigation phase, when an existing water main is identified as either being of poor condition, or is confirmed as presenting a high likelihood of failure of the water quality parameters (grade 4 or 5), it will be replaced through traditional rehabilitation techniques such as slipline, PIM (Pipe Insertion Method), opencut or directional drill.

Construction crew demonstrating Traffic Management in Knockjarder, Bradan A - Courtesy of Barhale Construction plc

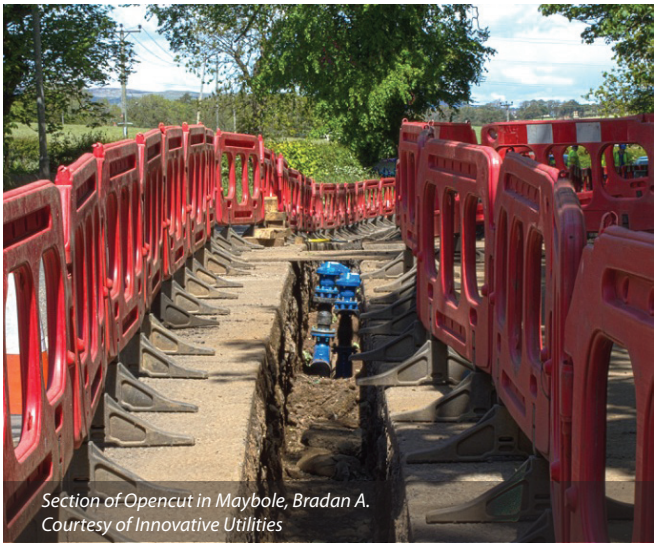
Design and innovation

Barhale Construction is responsible for the design of the project and has engaged RPS to design the works. The challenge for the designers has been to meet the quality output requirements for the lowest possible cost. A collaborative approach was identified at an early stage and the Design Teams joined the Delivery Teams in a co-located office. This opened communication lines, and has been a key element within the project's success and greatly increased efficiency.

The first task on site was a vast exercise to complete the walkover surveys of the 1,200km of potential work. This exercise produced substantial volumes of information and was paramount to developing a major programme of Site Investigation (SI) work. The Project Managers and Design Team working together identified sections of mains where trial holes, NDTs (non-destructive tests), coupon extraction and CCTV surveys would be completed.

When a main has been selected, a trial hole is excavated to locate the exact position of the main, and to confirm the location of other adjacent utility services as well as the ground conditions. The trial holes identified where further NDT examination is required, and a programme of NDT tests was drawn up. In this situation, a coupon (small core of the main) is extracted to provide a sample and to allow CCTV survey completed by inserting a small probe into the main via the coupon. A report is then produced grading the structural integrity of the water main from 1-5 (I. being in good condition and structurally sound, 5. being or poor quality and not structurally sound). This report is then issued to the deign team.

Once the SI has been completed for an individual DMA or WSZ, the detailed design is produced using the strategy for designing and delivering the project from source to tap, thus allowing the clean water to follow as the works advance.



Section of Opencut in Maybole, Bradan A. Courtesy of Innovative Utilities

Innovation has been an essential part of the process in order to achieve the Scottish Water Affordability and Efficiency targets. During the tender period Barhale identified that Daniels Contracting Ltd had a proprietary PU Lining product, Fastline Plus, and an alliance was formed between the two firms to deliver best value. Mains cleansing techniques such as Whirlwind and Typhoon have also been tried.

Planning programming and reporting

The planning, programming and reporting of the works is crucial to the success of the project. The team produced a "street level" detailed Primavera P6 programme to closely monitor all aspects of progress. A critical path has been identified, and is resource driven through the construction teams and designed to complete by the target date of summer 2012.

Progress graphs are produced on a weekly basis plotting the weekly construction outputs against target. The P6 programme can be filtered to report this by team, technique, location etc., and is owned and developed by a Project Manager.

The Critical Path analysis of the programme and Tender Schedules has identified 260km for PU Lining, replacement of 85km by slipline and PIM, 43km of opencut, 25km of abandonment and service transfers, and over 800km of mains cleaning techniques such as flushing, swabbing or scouring to be completed.

The Design and Delivery Team have been tasked to value engineer the solution, and within the DW5 project delivery criteria, meet the affordability and efficiency challenge.

Traffic management

One of the critical activities to progress the programme, and for its commercial success, is the requirement to closely liaise and negotiate with the Local Road Authorities, to ensure programme dates are met and all excavations within the highway are in compliance with RAUC - the Specification for the Reinstatement of Openings Roads October 2003 (HAUC in England and Wales) and NRSWA 1991 incorporating the Approved Code of Practice (ACOP) or Red Book.

Barhale has employed and developed its own internal staff to manage this process, ensuring that notices are ordered, opened and closed so that the company does not attract fixed penalty notices for failing to manage the NRSWA process, and this has been very successful. A NRSWA Action plan has been developed for the project, and flow charts identify the correct process for the application and management of Symology or Road Space.

Customer liaison

The very fact that DW5 work is being undertaken means that supplies to Scottish Water's customers will be interrupted, but there are very strict rules around what can, and cannot be done, together with penalties for overruns and unplanned interruptions that affect Scottish Water's performance score with the WICS. Accordingly, Barhale have employed several former Network Service Operatives as Customer Liaison managers to ensure that the highest quality of service to the customers is maintained.

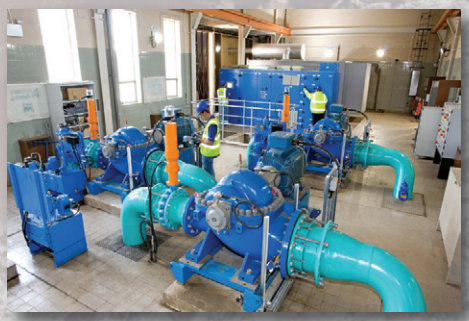
A great deal of work goes in to knocking on doors, personal contact, lettering, information on the website, and many other specific information channels have been opened by the DW5 team and the Scottish Water Communication Team, to inform and to update the 300,000 customers who will be affected by the works in the Ayrshire Region.

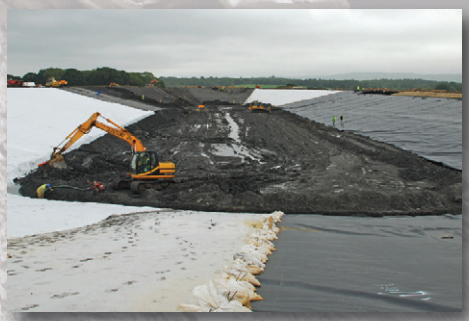
The Editor & Publishers thank Andrew Banks, Delivery Manager with Barhale Construction, for preparing the above article for publication.

Barhale

Barhale was formed as a specialist tunnelling contractor in 1980, and in 2010 we celebrated our 30th anniversary. Today we are one of the largest privately owned infrastructure specialists in the UK

- Barhale grew initially through the successful delivery of projects in the water sector, developing M&E capabilities and a fabrication and supply subsidiary, alongside our traditional tunnelling, civil engineering and utilities skills.
- Barhale remains a privately owned business, working UK-wide across the environment, transport and energy sectors. We provide design, construction and maintenance services under long-term contracts with blue-chip public, regulated and private clients.
- Barhale operates as a tier 1 partner to many of our clients, often working in integrated teams. 70% of our turnover is in long-term frameworks and half of our operations are in joint ventures with long-term industry partners, such as Scottish Water, Yorkshire Water, Anglian Water and Thames Water.
- Barhale operates a direct employment model and has a workforce of more than 300 skilled operatives. All of our people are trained through our dedicated training facility at our head office in Walsall.
- Our vision is to be the best at what we do, aiming to be the market leading infrastructure services provider.
- Our 3 Pillar Sustainability Model defines our mission, which is to be the safest, most efficient and most responsible partner to our customers, supported by sound systems and processes, talented people and an engaged supply chain.





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