

Venford WTW to Paignton rehabilitation of 100 years old water main

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Despite being laid some 100 years ago the 9” cast iron main carrying water 26km from Venford Water Treatment Works on Dartmoor to Paignton in Devon was structurally sound although there was a significant bore loss due to encrustation. This in turn has led to discolouration of the supplied water. The pipeline is gravity fed and the highest static pressures are 24 bar. It was also known to have a leakage problem with over 1MI of water being lost over its length. The initial approach was that a new main would be required.



Venford WTW to Paignton mains rehabilitation (copyright Still Imaging, Chudleigh, Devon, courtesy South West Water)



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Whilst the old main was laid in roads, mostly narrow wending Devon lanes, the new main could be laid mostly in fields. However, access and road crossing would mean significant road closures. Early in the evaluation it was obvious this would not be straightforward. 8km of laying Dartmoor in granite, special laying methods within the National Park and limited access over the rest of the route meant that the Budget Provision would be exceeded and the project would be socially highly disruptive.

After further evaluation of options South West Water appointed *Subterra* as design and construct contractor for the project, based on them utilising their *Subcoil* lining system to complete the works. The contract was IChemE “green book” with a Target Cost and the approach was a partnership with the contractor and South West Water working on planning and design together and then agreeing the Target Cost.

Preliminary work began on site in December 2000 with the installation phase of the work due to start in early February 2001. However, this was severely disrupted by the Foot & Mouth epidemic. All work on Dartmoor had to be suspended due to the National Park being closed.

The relationship already formed allowed a swift joint re-evaluation of the programme with minimal cost to move men and equipment to other sections of the job which were not affected. Under a traditional contract, there would have been claims for delay, disruption and consequential delay to the programme.

Subcoil pipe, a factory folded and strapped PE pipe on coils was supplied to the contractor by *Wavin Plastics*. Designed for distribution and smaller trunk mains and available in diameters from 4” to 9” *Subcoil* consists of a thin-walled PE pipe, which has been folded and bound with temporary restraints to reduce its effective cross sectional area. It is supplied prefolded as a coil on drums. Single lengths of up to 1000m can be supplied, with the maximum length varying in relation to the pipe diameter being

installed. For 9” the maximum length is 400m. This offers the potential for highly competitive lining installation rates to users.

Following preparation of the main to be lined, including scraping and cleaning, the *Subcoil* liner is winched directly into place between two previously opened access points. Access pits are normally small excavations of only 2m length, sufficient to access the pipeline and insert the liner. In this installation, with the host pipe buried at up to 3m depth, some larger pits were required.

The newly installed liner is then pressurised to break the temporary restraints. The PE pipe, manufactured from standard PE pipe-grade resins, then expands under continued pressure to form a close fit with the host pipeline. Once fully reverted, the ends are trimmed, and sealed to the ends of the host pipe using *Viking Johnson* liner grip end fittings. Any service off-takes are then re-made using specialist tapping and fitting equipment. With all seals and services completed the pipeline can be returned to service.

The *SDR41 Subcoil* used for the Paignton pipeline is only 5.4mm thick. This was possible despite the high pressure environment because the original main was generally structurally sound. It also provided a solution to leakage in the main.

As well as the cost advantage, rehabilitation of the main over open cut had significant advantages. Open cutting 26km of trenches would have created a large negative environmental impact. In the same way, extensive road closures would have created a negative social impact for the local population. The choice of *Subcoil* had major benefits in reducing these effects. In addition to reducing the social effects, there are few, if any, other solutions which could have minimised disruption so much on the Dartmoor National Park whilst maintaining the cost effectiveness of the lining process. ■

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