Barhale

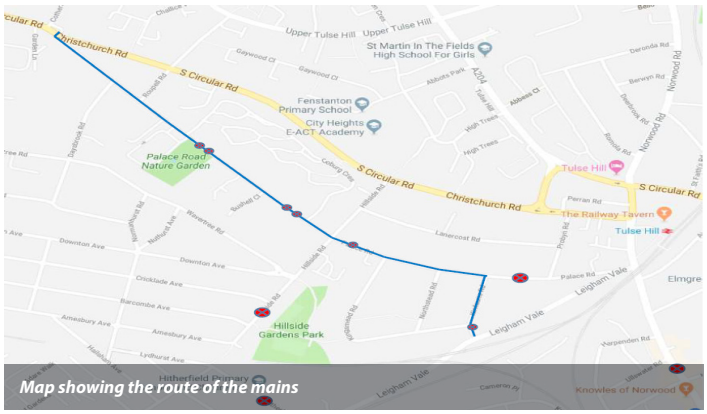
Palace Road – Trunk Mains Rehabilitation

Client:	eight2O
Location:	London
Value:	£1.5m
Duration:	10 Months

In Brief...

Throughout the latter part of 2016, Thames Water experienced a number of high profile incidents on several key Trunk Mains across London. Bursts occurred on mains in the Leigham Vale, Upper Street, Camberwell New Road, Stoke Newington, Lee High Road and Crayford Areas. Once the initial emergency works had been undertaken to restore service, Thames Water developed a planned programme of rehabilitation work, designed to prevent such incidents from happening again in the future.

As part of this project, Thames Water's eight2O alliance engaged Barhale to rehabilitate the existing 18 inch diameter Palace Road trunk main. This main presented significantly raised risks as it had experienced 5 bursts/leaks in the months prior to the works, and it was anticipated that another major burst would result in the repeat flooding of a number of properties. Overall, the team successfully replaced over 1.2km of main along Palace Road.



Map showing the route of the mains

Technical Specifications...

The site-team first carried out the requisite surveys to ensure that slip lining could be safely undertaken, and that the existing main would not damage the new pipe. A section of approximately 800m of the trunk main was isolated by Thames Water's team. After that, the Barhale site-team excavated a pit above the main, then cut and removed a small section of the main and carried out CCTV surveys over the full length of the isolated section. This was to ensure that there were no bends in the main that would obstruct the slip lining process, and to check for potential defects in the main that might damage the new PE main upon insertion. After this, the main was scraped and cleaned using a pipe cleaner. The final test consisted of inserting a "dummy" segment of PE pipe in the main, and running it along the route to confirm that no damage would be caused to it. This thorough inspection also helped decide the pulling lengths of the different segments, which were determined by the naturally occurring changes in grade or direction of the existing pipe system.


Checking the torque on bolts

The team then slip lined the main using 355mm OD SDR 17 PE pipe. The 6m long segments were joined through butt welding. The welded pipe was then pulled through the host main using a mobile winch block, with the winch and the cable assembly set up at the end of the installation in the reception pit, opposite to the pipe staging area in the launch pit. The cable was fed up the existing main to connect to a pull head on the front end of the new pipeline. The pipe was then pulled back through the existing main by the winch.

For the whole of the slip-line, the team utilised three launch pits:

- 10m x 2m x 2.5m deep
- 10m x 1.5m x 1.6m deep
- 10m x 2m x 3m deep

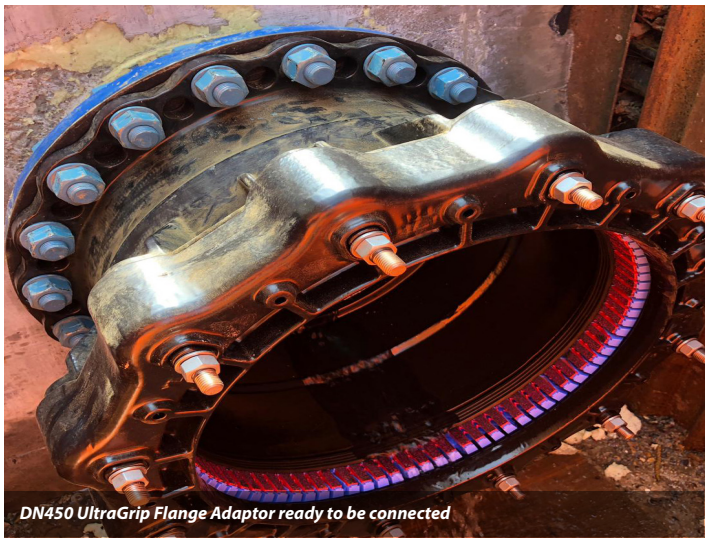
The team also excavated two reception pits (5m x 2m x 2.5m deep) and one intermediate pit (5m x 1.5m x 2.5m deep), which was used to monitor the pipe condition and to undertake pipework connections.

In total, Barhale slip lined 1,107m of the existing main with new PE pipe. The longest individual pull was 632m, which is the longest single slip line pull that Barhale have delivered to date. The remaining sections of slip lining were 280m, 115m, and 80m long respectively.

Where obstructions or angle changes within the existing main made it impossible to use the slip lining technique, the team instead installed ductile iron pipework through open cut excavation. The open cut excavation amounted to approximately 50m in total length.

Once the replacement works had been completed, the team undertook the following connections:

- Connect the new trunk main to an existing DN450 Ductile Iron with a thrust restrain block
- 7" connection back into an existing 7" Cast Iron main, using Ductile Iron fittings and PE pipe welded through electrofusion, with at thrust restrain block
- 12" connection of DN300 Ductile Iron with end restraint flange adaptors and bolted pipework, back into trunk main with a thrust restrain block
- Connect new trunk main to existing 18" Cast Iron trunk main with a thrust restrain block



DN450 UltraGrip Flange Adaptor ready to be connected

Technical Specifications Cont...

Afterwards, the team installed two air valves and a new OXO arrangement on the new main.

New pipe fittings were also installed to prevent expansion of the PE pipe when pressurised and to ensure that the new PE pipe has the resilience that is required for sustainable, long-term use.

Barhale also undertook the civils works for the following Syrinix Installations (these are chambers for installing probes into pressurised pipes and are used for monitoring purposes):

- 4no monitoring chambers on a 30" trunk main
- 3no trunk main monitoring chambers on the new 355mm OD SDR17 PE main
- 1no Aquamaster District Meter Chamber on a 7" main
- 3no trunk main monitoring chambers on an 18" trunk main
- 2no flow meter chambers
- 1no hydroguard trunk main monitoring chamber

The chambers were 1.5m in length, 0.75 in width, and of depths ranging from 2.5m to 5m. After constructing the chambers, the site team assessed the mains condition through non-destructive testing (ultrasonic techniques and CCTV surveys) and pressure tests.

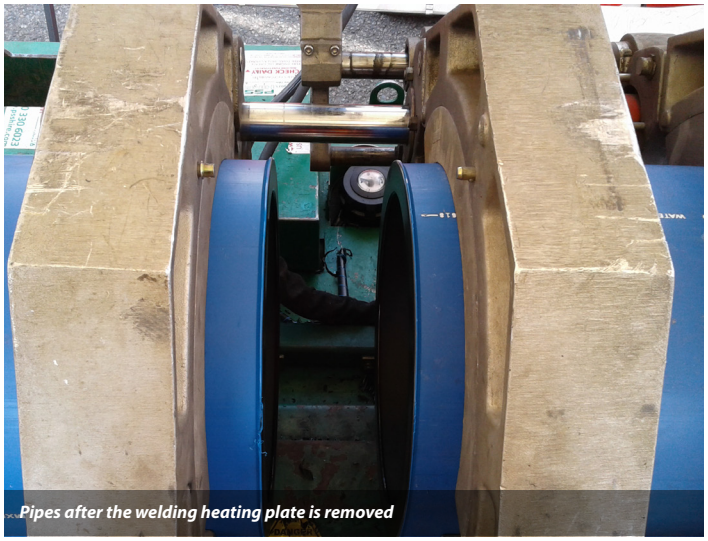
Customer Benefits...

The Client's original solution was to replace the main through deep, open cut excavation. This would have raised several risks including the closure of large sections of public highway and the management of contaminated soil. Additionally, an open cut of this this length would prove costly and time consuming.

To overcome these risks, Barhale proposed a slip lining solution for the majority of the replacement. As well as mitigating risk, this alternative was also approximately £3.5 million cheaper than the original design.

After carrying out the requisite surveys, Barhale further streamlined their solution by identifying the opportunity to complete 632m of slip lining in one continuous pull. By challenging the initial plan of only slip lining 100m of pipe at one time, Barhale were able to save an additional £200,000 on the budget cost. This also reduced the programme and minimised disruption.

During the works, Barhale had to deal with a number of unforeseeable changes that required speedy, accurate solutions to minimise both delays and costs. For example, while undertaking one of the excavations, the site team came across sewage water that was leaking into the excavation from an adjacent, broken sewer. The site team immediately stopped the works, and called in a separate Barhale team who specialise in waste water, in order to repair the sewer and decontaminate the area. A member of Thames Water's quality team inspected the repair and confirmed that work could proceed. Barhale's specialisms in both clean and waste water networks, along with a direct employment model enabled the team to promptly resolve this issue by engaging staff with the correct competencies and experience.



Pipes after the welding heating plate is removed

Interface with the Public...

This project took place in a busy part of London. The team therefore had to successfully manage sustained traffic flows, a local nursery and a number of residents. To achieve a high level of stakeholder management and customer interface Barhale proactively engaged with local residents and institutions through a range of interactions to mitigate any disruptions caused by the works. This included ensuring the works were explained, any concerns were addressed and traffic management was made a key priority.

Examples of everyday actions to help Thames Water's customers in the area include assisting a neighbour start their holiday by jump-starting the battery of their campervan, fixing a rusty gate to one of the houses on the street, trimming overgrown bushes on local residents' properties, and repairing the fence of a local park. Barhale also provided the means to manage traffic safely during a street party organised by local residents with the council's approval.

To minimise the impact on the local nursery, the site team slip lined straight past the front entrance, meaning that no excavations were undertaken in close proximity to the property. Barhale also delegated a designated traffic marshal to assist traffic at drop off and collection times.

This approach has augmented the reputation of eight$_2$O and Thames Water for outstanding customer service.