

Chatham Mains Replacement

48.5km of water mains replacement to reduce the risk of discoloured water

by Morné Cloete ND Civil Engineering

To ensure that Southern Water complies with its Section 19 undertaking to the Drinking Water Inspectorate (DWI) for improvements to the distribution system, the company is investing £14m to replace 48.5km of water mains across Chatham in Kent. The project is phase 1 of an overall scheme to replace 103km of mains in the Woolman's Wood Water Supply Zone. Southern Water will complete the construction, installation and commissioning of phase 1 by 31 December 2012 and phase 2 (54.5km) by 31 March 2020. Southern Water has employed Morrison Utility Services (MUS) to carry out phase 1 of the works and the 15-month scheme began in October 2011. Once phase 1 is complete, around 14,000 properties throughout Chatham will benefit from clearer, more robust supplies.



After a section of work has been drilled and the pipe pulled through, the towing head can be removed - Courtesy of One Red Eye

Background

The primary goal for the Chatham Mains Replacement Scheme is to reduce the risk of discoloured water coming from customers' taps, caused by harmless sediments of iron oxide or chalk which sometimes gather naturally at the bottom of water mains.

Some of the water mains in Chatham are made of cast iron and have been in the ground for up to 80 years and, despite regular maintenance, are beginning to show their age. These older pipes are being replaced by new blue Medium Density Polyethylene (MDPE) pipes, which will also reduce the risk of bursts and leaks as plastic pipes are more hard-wearing and flexible than metal ones and therefore less prone to problems.

The scheme will also include the renewal of non-polyethylene communication pipes and the installation of combined stop-tap/meter boxes in the pavement outside properties. Boundary boxes are also being installed on streets where pipes are not being replaced and these boxes will be used to house water meters which will be installed when Southern Water's Universal Metering Programme comes to Chatham in 2013. The Universal Metering Programme - featured in detail in *UK Water Projects 2011* - began

in 2010 and so far more than 150,000 meters have been installed across Hampshire, Sussex and Kent.

Reducing the impact on the public

From the start it was clear that the Chatham Mains Replacement scheme would have a significant impact on customers so detailed liaison with people who would be affected was carried out.

Before the work began, Southern Water and MUS carried out an extensive customer communication campaign to let people know what was happening and when. Nine pre-start drop-in sessions were held in community centres and other venues where customers could meet the project team and ask questions before the engineering work began in their area. Further update drop-in sessions are also being held to measure customers' experience of the progress.

By the end of March 2012 almost 44,000 letters had been sent to customers and this figure is expected to be in excess of 100,000 by the end of the project. There is also a dedicated 24-hour customer contact number and a customer office where people can come and talk to one of the team.



Barriered off service transfer excavations in road. Note existing services marked up on the footpath with spray paint – Courtesy of One Red Eye



Directional drilling in action. The factory sealed pipe end sticking out was the previous 100m length pipe installed – Courtesy of One Red Eye



MDPE pipe being pulled through behind the reamer attached to the directional drilling head – Courtesy of One Red Eye



Morné Cloete project manager for the Chatham Mains Replacement Scheme – March 2012 – Courtesy of Southern Water

Construction techniques

Various construction techniques are being used for the installation of the new water mains – open cut, pipebursting, directional drilling and sliplining.

- Open cut is being used only where absolutely necessary as it is the most expensive and time-consuming method and also causes the most disruption.

The other three techniques still involve some excavation but cause far less disruption and help save time and money.

- **Pipebursting** uses an expander head to break and displace the existing pipe into the surrounding soil, with the new one being pulled into place behind.
- **Directional drilling** uses a precision-guided drill to create a pilot tunnel which the new pipe is then pulled through.
- **Sliplining** uses the existing abandoned water pipe as a sleeve to pull the new pipe through. Since this is the safest and arguably the least disruptive technique, it is being used on the majority of the project.

These three “trenchless” techniques are generally a cost-effective rehabilitation method, primarily due to the speed of the operation. Since MDPE pipes are available on coils up to 100 metres long for sizes up to and including 180mm, trenchless techniques are mainly done for pipes up to this size.

The technique can be used for larger sizes of pipe but requires a lot of room for the sections to be welded together prior to installation. Service pipe installation is carried out using moling where possible as it is less disruptive than open cut, especially in the large number of narrow Victorian streets where front doors open onto the pavement and double-parking is common place.

Disinfection prior to commissioning

Installation of the new water mains requires the pipes to be disinfected prior to them being commissioned. This requires the use of relatively high volumes of water and, with the region officially in drought and water restrictions in place for customers, Southern Water looked at other ways of recycling it and liaised with the local council.

The council has agreed to provide two tankers to collect up to 3,000 litres of water a day from our site operations to be used to water plants in parks and public gardens.

Other innovations

Other innovations in the project included using an abandoned 6” cast iron gas main as a sleeve for a new 125mm section of pipe, which meant far less disruption for customers.

Protecta-Line barrier pipe was used in this instance to prevent the tainting of drinking water that can be caused by through-wall permeation of hydrocarbons.

Conclusion

Delivering 48.5km of mains replacement (equivalent to travelling from Chatham to London’s Oxford Street) 900mm below the surface in a congested area like Chatham is challenging. At peak times, Morrison Utility Services had eighteen pipe installation teams on site and careful planning is needed to ensure continuity of work.

At the time of writing (May 2012) the Chatham Mains Replacement project is making good progress and the team is confident of delivering this phase of the work on time by December 2012.

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