

# Ise Valley Sewer Rehabilitation

## temporary overpumping solution facilitates CIPP re-lining using ultraviolet and water cure techniques

by Anglian Water's @one Alliance

Ise Valley, Wellingborough, is home to the £1bn Stanton Cross housing development just off the B571 in the east of England. In late 2022, parts of the development were struck with leaks in the underground rising mains, causing disruption to many new homeowners during the Christmas period. In November 2022, Anglian Water was made aware of several leaks on each of the 700mm ductile iron rising mains from Ise Valley Terminal Pumping Station (TPS), which pumps flows of up to 1500 l/s. Both rising mains are required for normal operation of the pumping station and to convey the maximum flow, however, surveys showed that both mains had reached the end of their asset life due to both internal and external corrosion, and further leaks would occur if no action was taken.



Vanderkamp UK's overpumping pipework - Courtesy of Anglian Water's @one Alliance

### Background

Once the team attended site, it became apparent that both the north and the south mains had leakage issues. Non-destructive testing confirmed external pitting and internal abrasion wearing in the upstream sections and an internal hydrogen sulphide (H<sub>2</sub>S) attack on the downstream section, which was determined to be the primary issue.

With two leaks occurring in close proximity, and previous leaks occurring over the last 10 years, there was a substantial risk of more. The @one Alliance was engaged on 1 December 2022 with the immediate priority being to design, install and commission an temporary above-ground bypass to mitigate the impact of any further potential leaks while the permanent solution was identified.

The Stanton Cross housing development was recently constructed over the area along the route of the rising mains, with houses as close to the asset as 4m in places and leaving no clear route to bypass the flows. As an added complication, some residents located close to the rising mains reported feeling vibrations from the mains; the cause of which needed to be investigated.

### Temporary solution

It was identified that the rising main leaving the building from the north could be isolated and cut into, to provide a temporary overland pipeline fed by the existing pumps, which would avoid the need for temporary pumping equipment over what would have been the Christmas period. Although the five pumps had recently been mechanically overhauled, the team found several electrical issues that required repairs. As such it was arranged for three temporary variable speed drives to be installed as a matter of urgency, to better manage pump performance and to help prevent further bursts before flows could be diverted.

Utilising contacts across the @one Alliance's supply chain, specialist overpumping contractor Vanderkamp UK was contracted to provide a temporary bypass in short order. The teams decided on a 1m diameter pipe to give the equivalent flow of the existing twin 700mm diameter pipes to avoid reducing pump capacity.

Working around the clock to find a suitable solution, Vanderkamp UK, the @one Alliance and Anglian Water's Water Recycling Networks (WRN), allowed for a quick design and installation of the



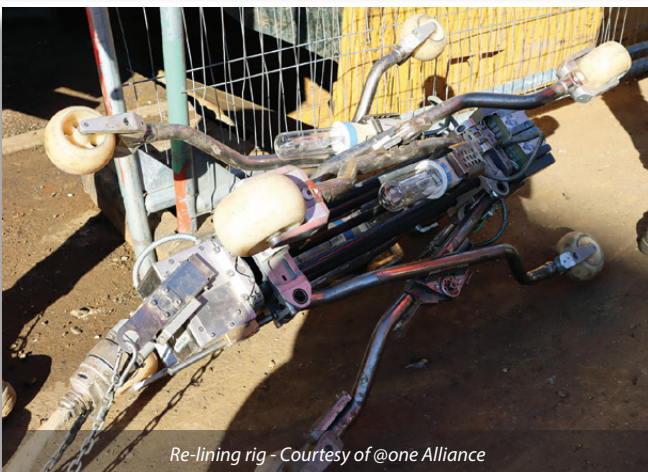
Temporary pipeline ready for assembly - Courtesy of @one Alliance



Road closures were necessary while installing the pipe bridges  
Courtesy of @one Alliance



Overpumping termination point - Courtesy of @one Alliance



Re-lining rig - Courtesy of @one Alliance

bypass. The whole team aided the process from construction design management documentation to hydraulic design, temporary works, customer and PR, supply chain and enabling.

#### Ise Valley Sewer Rehabilitation: Supply chain - key participants

- **Project delivery:** @one Alliance
- **Bypass pipework:** Vanderkamp UK
- **Cured in place relining:** OnSite Central Ltd
- **CIPP liner supply:** IMPREG GmbH

#### Overpumping bypass pipeline installation

In order to build the overpumping solution as quickly as possible, the @one Alliance team collaborated with the Integrated Operational Solutions (IOS) Alliance that provided provisional enabling works such as electrical isolation of services, excavation of the point of connection and temporary ground drainage/pollution avoidance provisions. With the initial works complete, the @one Alliance took full control of the site and initiated the installation of the pipeline.

Work of this scale required a coordinated customer strategy which was designed and implemented by the @one Alliance Customer Team who notified all affected customers of the planned works and continued to provide updates throughout the various stages of work making sure customers were informed and suffered the least impact possible over a busy Christmas period.

To make the connection to the bypass pipework, all flows were diverted to the south main and twin 600mm tee pieces were installed in the north main within the terminal pumping station compound. This arrangement allowed the south main to remain in service if required over Christmas. The connection was completed on 9 December with installation of the 1m diameter pipework commencing the following day.

Due to the new housing development, it was not possible to follow the route of the existing mains and care had to be taken to ensure the bypass pipework would not interfere with a permanent solution or the ongoing operation of the pumping station. A route along Driver Way and Irthlingborough Road was selected which included several pipe bridges in order to allow unrestricted customer access. Emergency road closures were agreed with both the local property developer and North Northamptonshire Highways to safely install the pipework.

The pipework installation was completed in just 10 days during an extreme cold snap which saw the @one Alliance and Vanderkamp UK operatives installing the overpumping pipeline in temperatures of -6°C. Nevertheless, the team worked two consecutive weekends to ensure the bypass was live and operational before Christmas. On 20 December 2022, the bypass was commissioned on time and to ensure there were no customer issues, inspections were carried out every day over the Christmas period.

#### Permanent solution

Testing and inspection of the mains showed that in the base of the pipe there were a series of what could be best described as wave patterns. The waves - the result of erosion of the pipe material - has been caused over many years by grit within the flow of sewerage. As the pipes rise steeply uphill the grit had settled at the base. Coupled with external and internal corrosion, susceptible areas of the ductile iron pipes have locally pin-holed, which had allowed leakage, and confirmed zero life span remaining in places.

Following the inspection and testing of the pipework, an accelerated *Risk, Opportunity & Value* sprint was held with all stakeholders to confirm the most suitable permanent solution. The team decided against the removal and replacement of the existing main due to the amount of time it would have taken to execute, additional disruption to customers and local traffic, and the small

working space available to the team. It was then determined that the most effective solution was to use a structural liner.

The location of the trial holes, which had been used for examination and non-destructive testing of the mains, had been carefully selected as potential relining pits in the event this solution was to be used. This allowed for an accelerated programme to prepare for the relining works and a reduction in carbon and costs.

Rehabilitation of the existing mains using specialist pressured cured in place pipe (CIPP) liners was selected. Framework supplier OnSite Central Ltd installed the liners using a combination of ultraviolet and water cure techniques to suit the challenging pipe conditions. Aware of the time constraints, OnSite Central Ltd worked with the project team to ensure the liners were delivered promptly from IMPREG GmbH in Germany, and that installation gangs were available to work extended shifts to ensure the challenging programme was delivered.

Once the relining was complete Vanderkamp UK began dismantling the overpumping, all of which was removed by the end of May 2023. Pressure and vibration monitoring of the temporary bypass pipework identified a correlation between pressure spikes and vibrations. This resulted in a change to the pumping station regime and, along with the new variable speed drives and the liner acting as a barrier, resulted in a large reduction of vibrations felt along the route once flows had been returned to the rising mains. Post works vibration monitoring at a number of previously affected properties confirmed the vibration issues had been resolved.

### Challenges

The team had to take into consideration a plethora of potential risks during the entire project lifecycle. From contaminated ground, congested buried services, extreme weather conditions, an construction challenges such as relining through 45° bends. The

team had to sufficiently ensure a timely plan was in place, following many detailed impact plans created to overcome these issues to ensure efficiency in completion of the project, and reduce the disruption to customers over the festive period.

### Customer liaison

One of the big challenges for this scheme was the disruption to the customers during the festive period, with the scheme attracting significant nationwide media attention over the duration of the works from national and local newspapers, BBC television ("Look East"), BBC radio (Jeremy Vine), and news and social media websites.

While this work went on, the @one Alliance Customer Team kept residents up to date with the team's progress while helping manage expectations as to how long the work would take, and how long the temporary structure would be in place. Communications to the local residents were consistent throughout the project lifecycle (from 2/12/2022 to 24/4/2023), ensuring constant updates, programme times, and responses to queries were included at all stages.

### Outcome

Anglian Water's £2.8m spend and proactive response to this issue enabled the successful relining of the existing pipe. The relining solution, which will give the pipe an expected 100 years of extra service, has been in service for over a year with no issues.

*The editor and publishers would like to thank Anglian Water's @one Alliance for providing the above article for publication.*

*The @one Alliance is a collaboration of 8 partner companies that each provide specialist knowledge allowing the Alliance to deliver complex delivery projects in the most efficient way, reducing the cost to Anglian Water's customers. The partners are Anglian Water Asset Delivery, Balfour Beatty, Barhale, Binnies, Mott MacDonald Bentley, Sweco, Skanska, and MWH Treatment.*



Installing the temporary overpumping solution - Courtesy of @one Alliance