

Grays Sewer Rehabilitation

CIPP relining of 840m of large diameter pipe following a proactive CCTV survey that revealed hydrogen sulphide damage

by Anglian Water's @one Alliance

As assets age, they start to work less efficiently than they did at their installation. Anglian Water proactively CCTV surveyed the sewers and found evidence of hydrogen sulphide attack, which corrodes concrete sewers resulting in weakening of the pipework and eventual collapse. In September 2023, the @one Alliance Sewer Rehabilitation Team completed a project in Grays, Essex, off the A1012 Treacle Mind Roundabout near the A13, where they rehabilitated over 840 meters of 900mm concrete sewer pipe along Lodge Lane - a crucial lifeline for a highly populated residential area.



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

Planning

From the outset, it was clear that this undertaking would require an innovative approach beyond conventional sewer lining and over pumping techniques. Two main challenges were faced by the project team.

The first challenge was to determine how to rehabilitate a 324m manhole-to-manhole stretch at this massive diameter at such a busy location and under tight highways restrictions. The team realised that they needed to trace the line and identify an optimal location for a new access point - a crucial step to break down the sewer into more manageable sections. Considering that the sewer crosses Lodge Lane halfway through, added with the need to avoid existing services and our bypass pipework, it became apparent that this was not a viable option.

The second challenge the team faced was the need for the sewer to be empty while the rehabilitation works took place. The team decided that in order to resolve this challenge, they needed to install a temporary above-ground pipe to divert the sewage flows.

This job was a significant undertaking, and one that required close collaboration with Vanderkamp UK. Working together, the @one Alliance/Vanderkamp UK team considered sustainable solutions to mitigate flows and ensure the continued integrity of Anglian Water's infrastructure.

To manage flows and ensure uninterrupted service to customers, temporary connections were established on the existing 600mm and 375mm dia. rising mains within the Treacle Mine Roundabout. These mains, originating from the Stifford Corran Way and Stifford Clays Pumping Stations, require pumping of up to 350 l/s.

The aim was to maintain seamless flow and mitigate any potential flood risks, so the bypass was routed through in-line duty/standby booster pumps strategically positioned within the roundabout. This innovative approach eliminated the need for suction pits or wet wells. Through extensive modelling, the team identified the need to incorporate booster pumps, as the existing pumping stations could not pump the additional 1km of 500mm bypass pipework, which included 16 pipe bridges and hoppers.



Overpumping pipework - Courtesy of @one Alliance



OnSite Central's CIPP lining operation - Courtesy of @one Alliance



Road closure during the overpumping works - Courtesy of @one Alliance



Customer information boards - Courtesy of @one Alliance

Vanderkamp UK undertook continuous and meticulous remote monitoring which ensured the successful execution of this complex and critical project.

Grays Sewer Rehabilitation: Supply chain - key participants

- **Client:** Anglian Water
- **Project delivery:** @one Alliance
- **Bypass pipework (1km of 500mm pipe):** Vanderkamp UK
- **Cured in place relining:** OnSite Central Ltd
- **CIPP liner supply:** IMPREG GmbH
- **Traffic management:** TBF Traffic

The 324m manhole to manhole stretch

Addressing the first challenge of rehabilitating the large manhole to manhole stretch, the team collaborated closely with Tier 2 Supply Chain partner OnSite Central Ltd, to prove a cured in place pipe (CIPP) relining solution. The @one Alliance challenged OnSite to develop a game-changing method that would enable a one-shot installation of the 324m length.

After exploring various options, including a single-cure installation that posed complications due to power cables, a 50/50 cure approach was selected, partially curing the liner in both directions.

To ensure the liner's integrity throughout this process, OnSite Central Ltd ingeniously employed special sluice bags to keep the liner inflated while moving the light train to the other manhole; effectively preventing any shear damage to the liner during the transition between cured and uncured sections.

The deployment of specialised equipment, including a large 20-ton winch, a larger roller bed, crane pads, and sluice bags, incurred additional costs, however, savings totalling approximately £35k included avoiding the need for an additional liner installation, a week of over-pumping, and substantial running costs. Additional significant savings were gained by removing the requirement for a new 6m deep access point and extended road closures.

In terms of sheer length, this installation now holds the record as the longest the Anglian Water @one Alliance Sewer Rehabilitation Team has ever undertaken. OnSite also suspect that it might even be a record-breaker for UV installations in the UK, if not globally! Typically, cable length restrictions cap such installations at around 300 meters, making this 324m achievement truly exceptional!

Challenges

As with any project, challenges arise. Added to the previous challenges mentioned, the team had plenty more to overcome.

Ensuring resources: Learning from concurrent @one Alliance projects, from the outset, the team knew that they needed to ensure resources were available for the project to commence, therefore early resourcing was required to overcome issues on programme later down the line.

Avoiding planning issues: Once the project started, the tight highways restrictions throughout and multiple live permits in the area could have caused planning issues if the team had not realised these early and planned for them at the start of the project, so they worked with Highways early to identify a suitable working window.

Emergency road closure: Another issue was having to emergency-close Lodge Lane due to two leaks across the pipe bridges. The team identified these by using treated final effluent to ensure no pollution events would occur. To resolve this issue, an emergency road closure was put in place on Lodge Lane for 2 hours from 8-10 PM in order to safely access the pipework at the leaks and tighten the bolts. After collaborations with Highways the closure in place safely put in place.

Additional cleaning: Once flows had been diverted and a detailed CCTV survey was undertaken, it was apparent that more cleaning of the sewer pipe was required, taking longer than was originally anticipated. In order to claw this time back and ensure the project completed on time, the team installed two liners in a week. To do so, the final liner installation needed to be extended into the weekend. This required an adjustment to the road closures on Windsor Avenue which was agreed with Highways and communicated to the local residents.

Avoiding potential issues: Challenges do not only affect the project team; they also affect customers. The team was made aware of visibility issues due to the temporary pipework obstructing the view from a junction, creating a potential blind spot. Responding promptly to feedback from the public, the team worked with the Highways Inspector to install temporary mirrors and mitigate the issue.

Customer engagement

The @one Alliance has a clear purpose to bring environmental and social prosperity to the Anglian Water region, and this is done by *'Making Today Great – every day, in every interaction.'*

The @one Alliance was aware that the work at Grays would impact customers throughout the project lifecycle, so processes were put in place to effectively communicate with customers across the area in a variety of ways.

- **Open day:** On April 26th, 2023 an open day was hosted at Stifford Parish Hall to give the community the opportunity to meet the team and ask any questions or share any insights before the project began to ensure they had a clear idea of the plan for the project.
- **Communications:** Customers were notified about the works via letters, emails, SMS campaigns and a dedicated

scheme board. In total, over 1,444 letters and 970 emails were sent to residents on top of 13 SMS campaigns which resulted in 2,755 customers receiving text messages to let them know of specific road closures and project updates.

- **Social media:** Projects updates were regularly updated on Anglian Water's "In Your Area" website for customers to view and on its Facebook page. The Facebook page reached 63,387 customers in total throughout the project.
- **CSAT score:** A record number of 9+ scores were received for a scheme with a resulting in a 9.18 CSAT score.

Meticulous planning ensured customers were aware, questions were answered, and feedback was received. Overall, customers have praised the work that has been undertaken; emphasising the minimal disruptions and their appreciation for the use of temporary traffic lights.

Outcome

The works started in June 2023 and completed in September 2023 with the removal of the temporary pipe bridges and traffic lights. Over 840 meters of 900mm sewer pipe have been successfully rehabilitated along Lodge Lane. The project was delivered on time, and gained positive customer feedback, positive relationships with the local council and Highways authorities and a great working relationships with our Tier 2 suppliers Vanderkamp UK and Onsite.

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.



Vanderkamp UK's temporary overpumping pipework while OnSite Cental undertake the CIPP lining works - Courtesy of @one Alliance