Use of Trenchless Technology by Yorkshire Water & needs

UKSTT No-Dig Roadshow

Thomas Ogden - Innovation Technical Specialist Yorkshire Water Waste Water Networks

YorkshireWater

The Clean & Waste Networks in Yorkshire

- 5 million customers
- 12 Long sea outfalls on Yorkshire coast
- 640 sewage treatment sites
- 1.0 billion litres of sewage treated per day
- 52,607 km sewers (21,560 km transferred in 2011) only 33,000 km of this is mapped
- 2,700 pumping stations (720 pumping stations transferred in 2016)
- 1,300 km of pressure sewer
- >2 million manholes
- 1,087 km river
- 32,375 km clean water network

AMP 8 Investment

Yorkshire Water's largest ever environmental investment of £8.3bn!!!

- £1.5 billion to reduce storm overflows into the region's watercourses
- £406m to renew the regions clean water mains
- £360 million to prevent nutrient pollution in watercourses
- £327 million rolling out smart meters to help customers save water and reduce their bills
- £51 million to increase our asset resilience
- £75 million for environmental protection and improvements

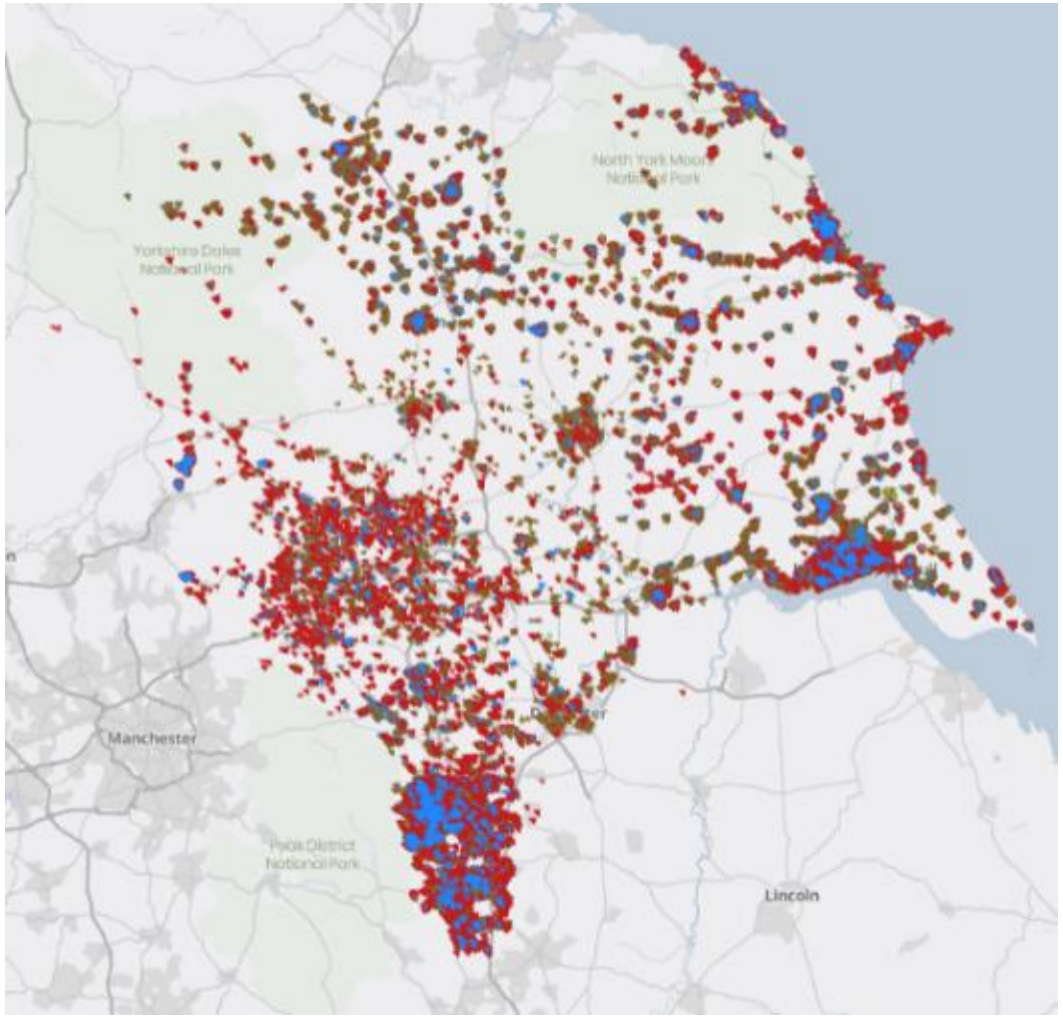
YorkshireWater

Current Trenchless Applications at Yorkshire Water

YorkshireWater

Inspection of Sewers

Estimated 52,607km of sewer network maintained by Yorkshire Water



CCTV & work orders

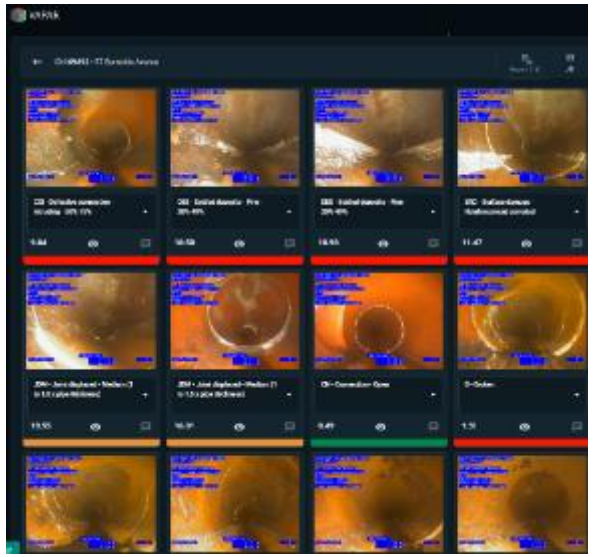
2000 Reactive Mainline CCTV orders per year covering 163,000m
6 teams

200,000m surveyed per year for Proactive Pollution
8 teams

100,000 properties surveyed per year
40 teams

100,000 Reactive orders completed per year by
225 teams approx.

An estimated 2.4 million meters of sewer surveyed per year!!



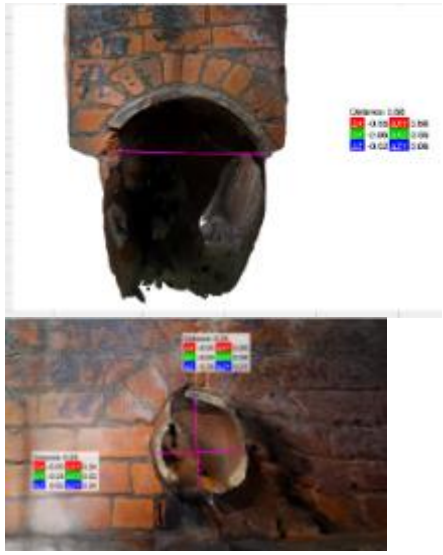
AI coding of CCTV footage is been tested strategy is been developed

YorkshireWater

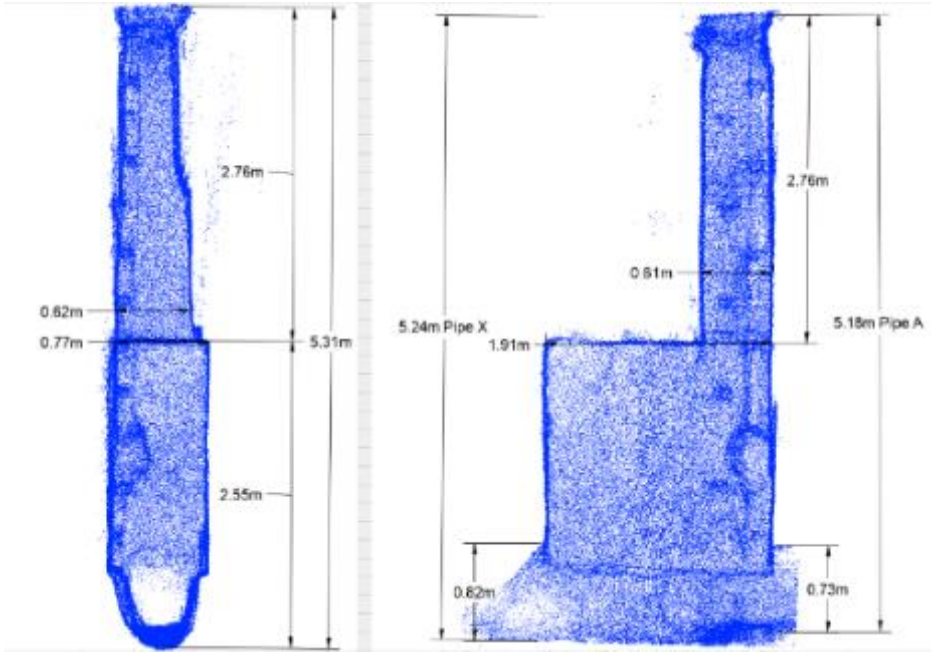
Inspection of manholes

- Work done to demonstrate the use of 360 degree cameras & AI to survey manholes
- The machine learning function provides insights into the following:
- Feature identification (step irons, pipes, manhole components…)
- Component dimensions (pipe diameters, invert depth etc…)
- Currently, in development are the asset condition assessment AI models that interpret faults and defects within the manhole
- This AI defect identification will allow us to build a condition understanding for manholes which have never previously been inspected in this way

Automatic AI feature identification



Point cloud creation to enable full manhole assement and measurments



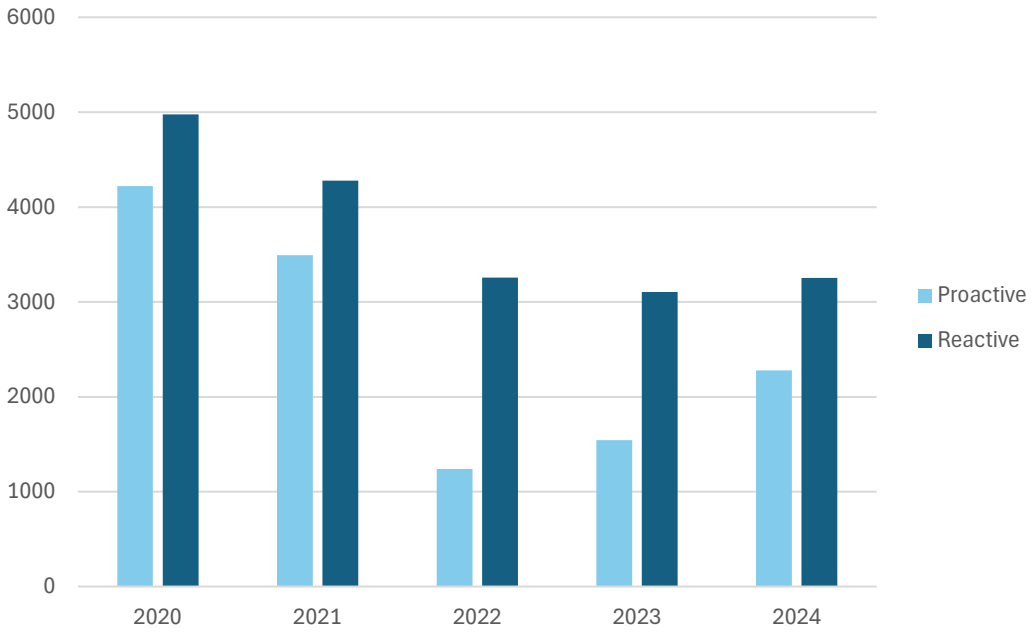
Further work planned this AMP to roll out this technique as part of our roll out of sewer level monitors

YorkshireWater

CIPP lining

Over 31,000 Lining jobs completed between 2020 & 2025!!

Around 1/3 of this work is proactive and 2/3 reactive.



Historically most of the work has targeted flooding and pollution.

There is a change in focus this AMP with lining for infiltration becoming a focus

YorkshireWater

Ilkley Tunnel

The Ilkley Tunnel, constructed as part of Yorkshire Water's AMP7 and AMP8 investment programmes, has the following key specifications:

- **Length**: 835 metres
- **Diameter**: 2 metres
- **Purpose**: To intercept and store storm flows from the Rivadale View CSO, reducing spills into the River Wharfe
- **Storage Capacity**: Approximately **2,500 cubic metres**
- **Cost**: The tunnel forms part of a broader £13.4 million investment in the Ilkley STW and upstream CSO upgrades

This tunnel is a critical component of Yorkshire Water's strategy to reduce storm overflow discharges to just one per bathing water season, in line with Environment Act targets.

YorkshireWater

Spray lining

1. Spray Lining of Rising Mains

The foundational project demonstrated the successful application of a 3mm Acothane WasteSeal spray liner to a 250mm ductile iron rising main at Outwood, Wakefield. This lining restored structural integrity and extended asset life by up to 50 years

•**Partners**: Axalta, Schur Ltd, Duffy's

•**Benefits**:

- Minimal excavation required
- Rapid installation (lined in 4 days)
- Up to 80% cost savings vs traditional methods
- Reduced carbon and customer disruption

2. Gravity Sewer Spray Lining

Following the rising main success, the team extended trials to gravity sewers, including:

•**Manhole-to-manhole lining** in wet environments

•**Tooling development** to enable lining without excavation

•**Material adaptation** to improve build thickness and curing time

Spray lining was shown to be effective in sealing infiltration points and rejuvenating ageing assets, especially where access is limited or excavation is impractical.

•**Challenges**

There were significant challenge with the management of flows especially unmapped connections to the sewer network during this project

3. Lateral Sewer Spray Lining

A major innovation focus has been on lining laterals (100–150mm) from properties to the main sewer—particularly in cellared areas with no manhole access.

•**Access via**: Soil stacks and gullies (90–100mm diameter)

•**Technology**: Rabbit Coater system by Polypipe, supported by Morrisons

•**Benefits**:

- No excavation or reconnection cutting required
- Completed in a single day by one team
- Effective through diameter changes and junctions
- Seals the sewer network preventing flooding

YorkshireWater

Designer Liner Ofwat Innovation Fund Project

YorkshireWater

Designer Liner

A lining solution fit for a 21st century water network

Challenges & opportunities → **Investment** → **Project** → **Solution**

- Regulation
- Testing
- Ambition
- Cost

Ofwat Innovation Fund

£3.6 million

Designer Liner

Phase 2

Project partners

Thames Water

Affinity Water

YorkshireWater

Dŵr Cymru Welsh Water

Scottish Water
Trusted to serve Scotland

Materials Experience

NATIONAL COMPOSITES CENTRE

Bristol Composites Institute

Industry Partner(s)

Domain Expertise

wrc
independent | trusted | innovative

TETRA TECH

rps
A TETRA TECH COMPANY

Designer Liner
Phase 2

Supply Chain partner/s

- We will shortly be sharing an invitation for Expressions of Interest to any lining supply chain companies interested in joining our project
- We are looking for one or more partners who can support our work and then help to get the product to market
- The opportunity will be shared on **LinkedIn**, as well as via other routes such as the Ofwat Innovation Fund website, Future Water, British Water, Pipeline Industries Guild and UKSTT

Future needs of Trenchless Technology

YorkshireWater

Key hole repairs on sewer networks

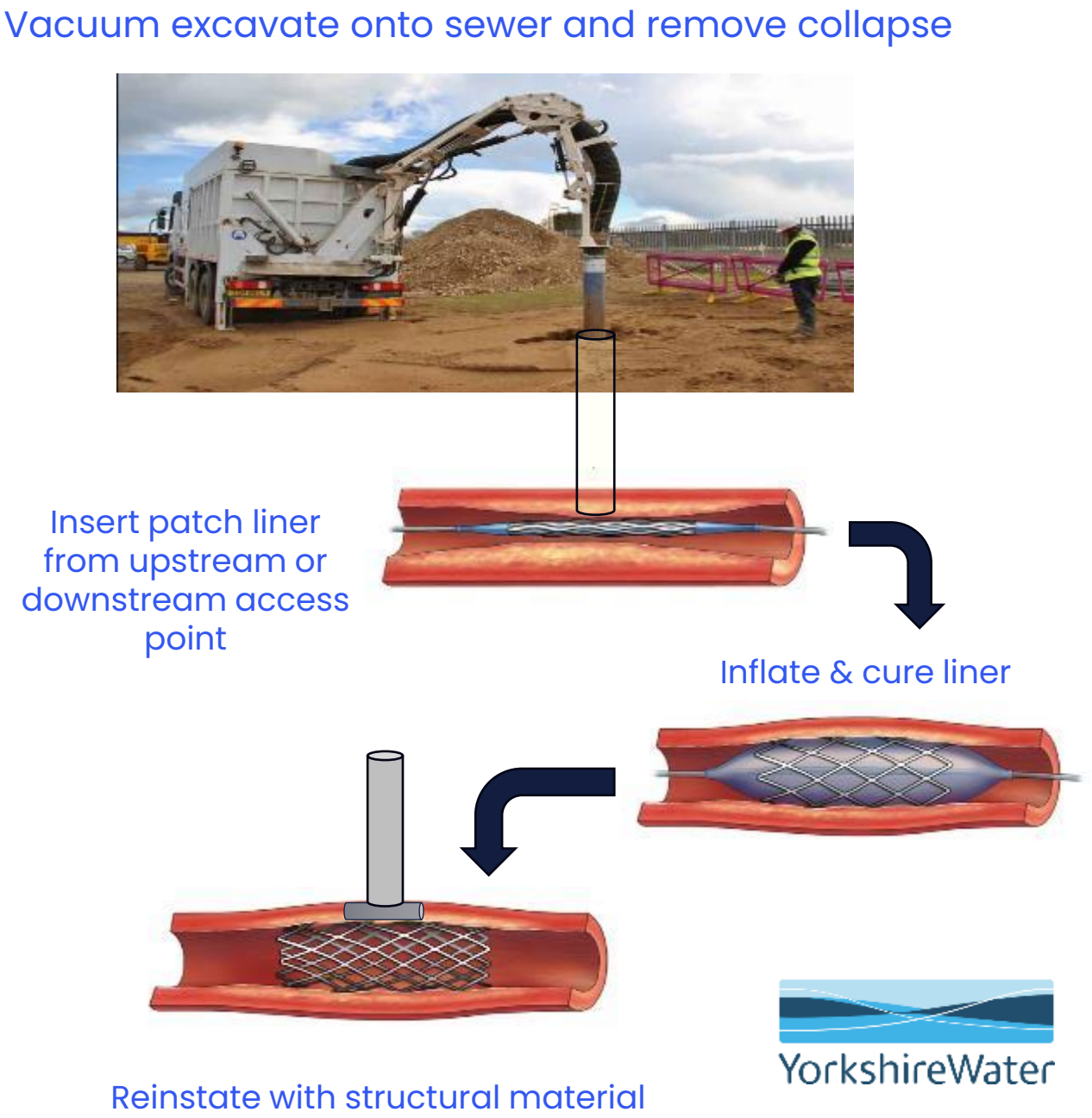
Out of the 31,000 lining jobs completed over 10% of these required excavation to insert the liner

Spray lining could be used to repair some of these issues where the structure of the pipe has some integrity. Where the pipe has partially or fully collapsed, we need a different solution.

Challenges around the depth of the sewer network and other services mean that large holes need to be dug to make the repairs safely

This causes substantial cost to be incurred by Yorkshire Water, delays in resolving issues for the customer and frustration to road users with traffic management or closures needed for an extended period.

Between 2020 & 2025 there were over 15,000 open cut excavations carried out at Yorkshire Water on the sewer network.



Repair / replacement of end-of-life liners

What happens when sewer liners reach the end of there asset life?

With over 31,000 sewer liners installed in Yorkshire over the past 5 years this could become a big issue in the future.

Research is needed to

- Understand the condition of the oldest liners
- The failure mechanism of these when they do start to fail?
  - If they start to leak, they could cause flooding
  - If they lose their structure, they could cause blockages
- Methods to repair these using trenchless technology without further reducing the pipe diameter

YorkshireWater

Thank You

Any questions?

YorkshireWater