



Network monitoring for the 21st century

Innovative detection of illicit inflows or misconnections in surface/foul water system comes to the UK.

Since 2008 Royal HaskoningDHV has been pioneering the development and application of the Distributed Temperature Sensing (DTS) technology which allows the monitoring and locating of temperature changes within water and sewer networks to identify illegal foul water discharges or the extraneous inflow of storm water into a sewer system.

What does the DTS system do?

The DTS system has successfully been used to identify problems, within sewer and pipe networks including;

- illicit connections of foul water discharge into storm sewers
- misconnections of storm water into foul water networks
- extraneous inflows in the sewer network leading to frequent flooding or high demand on pumps
- assessing the malfunctioning of structures in sewers such as faulty non return valves.

Why use DTS?

The DTS technique provides non-intrusive continuous monitoring over several weeks for multiple sewers within a network, allowing for temporal variation in the sewer conditions to be monitored unlike traditional CCTV inspections which only give snapshots in time.

The results allow you to pinpoint to the metre the location of issues within the system as well as identifying under what conditions the malfunction occurs. The results combined with flow and level monitoring techniques also allow the quantification of volumes entering the system allowing for business case justifications to be made for maintenance over capital work costs.

The DTS system allows misconnections and faults in networks to be identified quicker and more accurately than ever before.

How does it work?

The DTS monitoring technique uses a fibre-optic cable that is placed into the sewer or storm pipe to be monitored. The fibre-optic cable is then attached to a laser-computer instrument which sends pulsed laser light into the fibre-optic cable and processes the reflected signal into temperature values.

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Typically, temperature readings are obtained every 30-60 seconds for every meter of the cable, which can be up to 1500m in length. Multiple cables can also be monitored using the same laser computer allowing whole networks to be monitored.

These results are monitored over a 3 to 4 week period, giving a highly detailed monitoring survey of the sewer and how it functions. During the monitoring period, the results are frequently reviewed by remote observation to ensure continuous capture.

At the end of the monitoring period the readings are amalgamated and analysed using algorithms developed by Royal HaskoningDHV to identify the locations of malfunctions and faults within the sewer system. These results are presented in a very visual graphical output showing the locations and scales of inflows, misconnection or other irregularities.

Where has it been used?

The innovative monitoring technique has been used for over 25 applications across Europe including the Netherlands and Germany, to solve troublesome network issues that traditional survey techniques have not been able to resolve.

The first UK deployment of the DTS technology was undertaken by Anglian Water in early 2013, for a catchment area that suffered from unexplained frequent sewer flooding near a number of properties due to the capacity of a local pumping station being exceeded.

The trial project simultaneously monitored two sewers totalling 1500m in length for four weeks. The results of the monitoring identified the precise location and scales of six major extraneous inflows within the sewer including the inflow of surface water from an overflowing pond during heavy rain.

This successful outcome followed various unsuccessful attempts including traditionally CCTV and house to house surveys to try and identify the problem with no success. The trial has allowed Anglian Water to target their maintenance investments rather than undertaking capital works to increase the capacity of the pump station and its subsequent on-going costs.

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