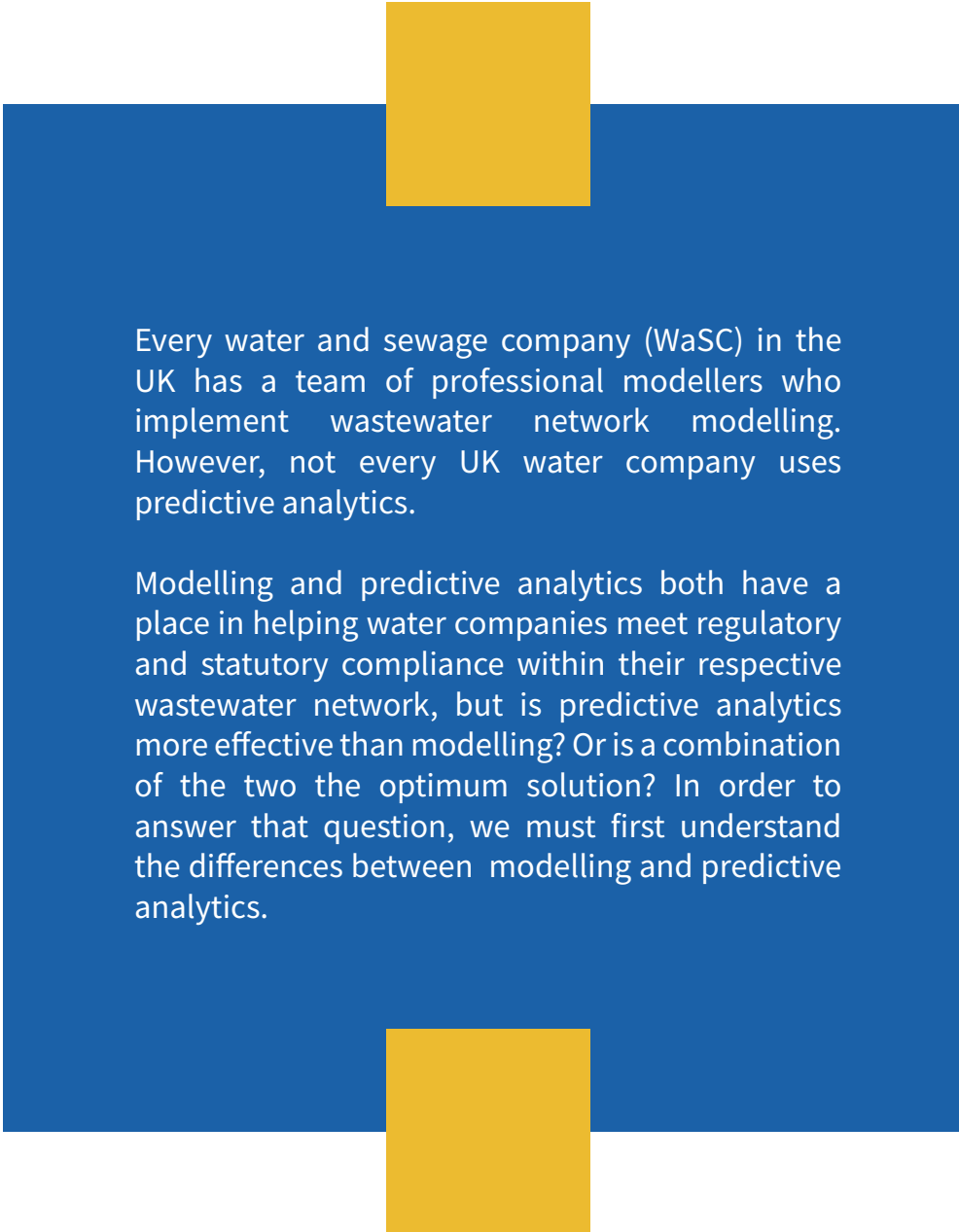# DETECTRONIC

WHITE PAPER

THE DIFFERENCE BETWEEN LIVE MODELLING AND PREDICTIVE ANALYTICS

PUBLISHED MARCH 2020

Every water and sewage company (WaSC) in the UK has a team of professional modellers who implement wastewater network modelling. However, not every UK water company uses predictive analytics.

Modelling and predictive analytics both have a place in helping water companies meet regulatory and statutory compliance within their respective wastewater network, but is predictive analytics more effective than modelling? Or is a combination of the two the optimum solution? In order to answer that question, we must first understand the differences between modelling and predictive analytics.

What is Modelling?

Modelling uses specialist computer software to create a mathematical model of a water, sewer or storm system and is specifically used to analyse the system's hydraulic behaviour. Wastewater network modellers use this hydraulic model to better understand the wastewater network with the ultimate objective of investigating and resolving water infrastructure challenges.

Each individual hydraulic model takes into account normal and wet weather conditions and looks at how the wastewater network performs during different conditions. If the network performs as it should according to the hydraulic model, then all the calculations are deemed correct. The water company can then be confident that its network, including the many miles of pipes, pumping stations, various wastewater treatment plants and hundreds of combined sewer overflows (CSOs) are working efficiently and effectively.

Flow surveys or continuous monitoring is often used to verify and expand on hydraulic models. This is often when predictive analytics proves its long-term, advanced worth.
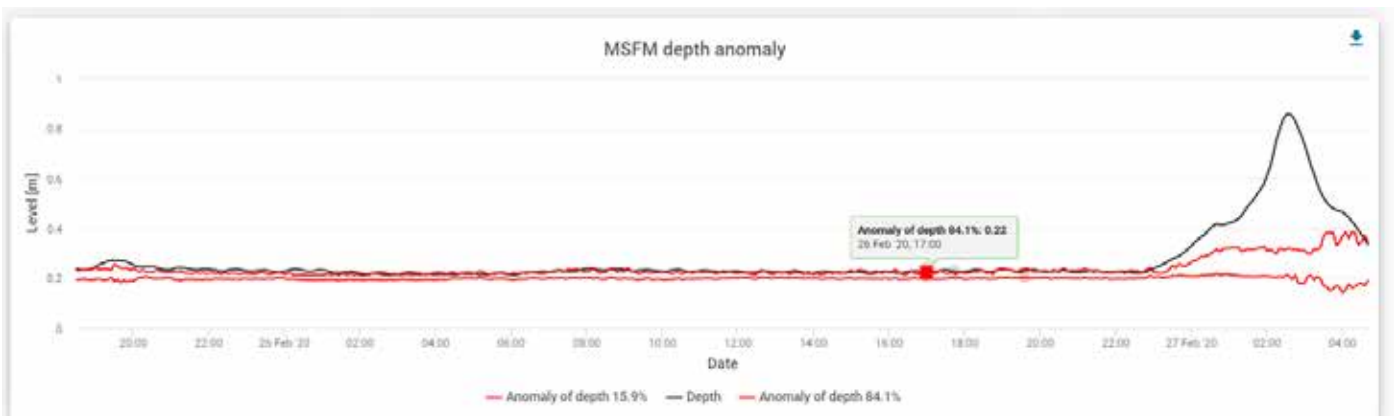
What are Predictive Analytics?

Predictive analytics is the process of extracting information from data to predict trends and behaviour patterns within the wastewater network. Usually based on Machine Learning (ML) from live and historical data, predictive analytics will provide insights based on the actual performance of a network rather than a hydraulic model that may only be calibrated once a year.

Predictive and real-time analytics facilitate the detection of blockages and asset failure in real time as highlighted in the trend below taken from a live monitoring site. The graph clearly shows the level going way above the normal operating band, indicating a downstream blockage or pump failure.

What are the Benefits of Predictive Analytics?

There are many benefits to implementing predictive analytics within a wastewater network. These include:

Real-time Insights

The ability to react in real-time to network changes allowing for immediate operational decision making to be facilitated.

Machine Learning

Predictive analysis using machine learning models scales better and is quicker to implement for a large number of instruments, as opposed to live modelling that requires more manual effort and ensuring that properties of the assets are correctly entered in the model.

Accessibility

Access to screen views generated by predictive analytics can be delivered to a wide number of people, whereas models often tend to only be seen by modellers.

Budget Friendly

Predictive analytics is highly cost effective compared to models that tend to be extremely expensive and require greater maintenance.

Scaleability

Additional, real time assets can be added quickly and easily.

Integration

Predictive analytics can be linked directly to hydraulic models, control rooms, SCADA and GIS programmes to further enhance immediacy and visibility across the water company.

Power Consumption

Machine learning does not require anything like the CPU processing power running continuous real-time models does since most models are not run in real time

Complementary

Predictive analysis can be used for maintenance of the current sewer system design, whereas live modelling can be used to find design bottlenecks – the two complement each other to provide the opportunity to simulate different design changes, for example.

How does DetecAnalytics generate future insights with precision?

Ongoing support with hydraulic modelling and monitoring in real-time are services Detectronic has been providing for many years and the next evolution – AI pattern recognition + 1 and machine learning for predictive analytics solutions – is now here in the shape of DetecAnalytics.

DetecAnalytics is an AI-powered predictive analytics tool for wastewater sewer networks and water recycling centres and takes data analysis and reporting to a whole new level.

Designed to work in conjunction with models, it uses dry weather flow and wet weather flow models to establish typical behaviour and then uses data sources from sewer monitoring equipment, weather etc. to build predictions and continually learn from them.

As a result, water companies are empowered to make fact-based decisions quickly to improve processes and performance. This includes lowering operating costs, reducing capital investment and enabling proactive maintenance, warning of leaks, bursts, overflows and pollution incidents.

Insight and optimisation

Using real time data from sensors in sewers and pumping stations, DetecAnalytics transforms the data into valuable insights of the actual performance of the entire wastewater transport system. It can also actively control sewage pumping stations to optimise the total sewage system, including wastewater treatment plants.

DetecAnalytics works by collecting the data recorded on Detectronic flow, level and rain gauge monitors located throughout the catchment and transmitting it a secure, reliable cloud platform. It uses smart algorithms to turn that real time data, historical data and any additional data into predictions of future levels over the next 48 hours.

Detectronic hydrologists review the data alongside the predictive analytics software to verify the alarm protocols. The additional human intervention helps identify any existing network issues such as infiltration and external influences including changes to urban development over time

By being able to predict sewage overflows, pipe friction loss, pump efficiency and energy consumption, the water company can further enhance self-reporting, benefit from better asset management with predictive maintenance and, ultimately, be in a position to improve overall operational and financial performance.

Conclusion

Both modelling and predictive analytics offer multiple benefits to every WaSC. There are distinct advantages to each, and they undoubtedly complement each other. The ability to predict what will happen in the network before it even happens is a very powerful tool. This can only be achieved by implementing predictive analytics that work in unison with traditional catchment models to provide a precise view of the future that will only improve over time.

Why Detectronic

Detectronic has a long history of engineering wastewater monitoring solutions and providing reliable insights to help companies manage their wastewater networks