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The Future of Event Duration Monitoring

By Dave Walker, Global Future Trends Director at Detectronic

I recently delivered a webinar alongside my colleagues at our parent company, Adler & Allan, to discuss the future of EDM monitoring. We had a very positive response to the webinar, as such, I wanted to put together a white paper on the subject with a view to encouraging further debate on this pertinent topic.

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Global Future Trends Director at Detectronic

What is EDM Monitoring?

A critical aspect of managing wastewater systems, EDM monitoring is the process by which the duration and frequency of overflow events are tracked. EDM monitors are specifically used to deliver this type of monitoring to provide data on how long and how often an overflow lasts when the capacity of the network is exceeded.

The Evolving Landscape of EDM Monitoring

There are currently 14,241 combined storm overflows (CSOs) fitted with event duration monitors located in the UK water network. And with approx. 15,000 CSOs in total, this represents a big tick for the water industry. However, as the landscape of EDM monitoring continues to evolve, water companies face a number of new and varied challenges over the next few years.

The first, and perhaps most pressing, is that from 1st of April 2025, the UK regulator requires that all replacement EDM monitors must be MCERTS certified. There is a key reason behind this. It's all well and good having an EDM monitor in place, but can that monitor actually be relied on to provide accurate and robust data? This is the reason why the MCERTS standard for EDM monitoring has been introduced.

The second challenge is that we are going to see the number of regulatory inspections that water companies must undergo each year potentially quadruple. With a higher frequency of visits from the Environment Agency and Ofwat,

the implementation of best practice monitoring can no longer be ignored. Furthermore, in 2027 a review of the storm overflow discharge reduction plan is scheduled. The £60[1]billion invested into this program will give water companies that do get their EDM monitoring right the opportunity to draw down further funds from the program to support their cause and help manage the associated challenges.

Technological Innovations

Future Technologies:

As the field of EDM monitoring evolves, several technological advancements are emerging that promise to revolutionise how we manage wastewater systems. Among these innovations are:

Advanced Sensor Technologies: New sensors are being developed with higher sensitivity and accuracy, capable of detecting even the smallest changes in water levels and flow rates. These sensors are often more robust and durable, reducing maintenance needs and extending the lifespan of monitoring equipment.

AI and Machine Learning: Artificial Intelligence (AI) and machine learning algorithms are increasingly being integrated into EDM monitoring systems. These technologies can analyse vast amounts of data in real time, identifying patterns and predicting overflow events with unprecedented accuracy. This proactive approach allows for quicker response times and more effective management of wastewater systems.

Smart Network Monitoring: Smart water grids utilise interconnected sensors and data analytics to optimise the operation and maintenance of water and wastewater networks. This integration can enhance the effectiveness of EDM monitoring by providing a more holistic view of the entire network.

[1]The Rt Hon Thérèse Coffey MP - Storm Overflows Discharge Reduction Plan. Presented to Parliament pursuant to section 141A(8) of the Water Industry Act 1991[September 2023]

Integration with IoT:

The Internet of Things (IoT) is transforming how we monitor and manage wastewater systems. IoT-enabled EDM monitors can communicate with each other and centralised control systems, providing real-time data and insights.

Key benefits include:

Remote Monitoring: IoT devices allow for remote monitoring and management of wastewater systems, reducing the need for on-site inspections and enabling quicker response to issues.

Data Integration: IoT facilitates the integration of data from various sources, including weather forecasts, water usage patterns, and historical data. This comprehensive data set can improve the accuracy of predictions and enhance decision-making processes.

Predictive Maintenance: IoT devices can monitor the condition of EDM monitors and other infrastructure components, predicting when maintenance is needed and preventing failures before they occur. This reduces downtime and maintenance costs while ensuring continuous operation.

LUCID - Data Security: Lucid provides a new protocol suited to smaller devices with IoT-like functionality. It enables users to mass deploy devices whilst maintaining control of installation and configuration costs. Despite being aimed at smaller devices, Lucid still provides most of the functions available from its slightly more capable cousin WITS-DNP3.

The Urgent Need for Robust and Accurate Data

Before we explore why we must strive to gather the most accurate data we possibly can, I must give a nod to the seven water companies that announced and released data relating to their EDM monitoring in May, two of which even released live data on their CSOs.

Since the public's trust in water companies is at an all-time low, this is a big step forward. Driven by Government, stakeholder and customer demand for transparency, this has to be the right way to go and should give water companies

the confidence to stand up and share how they operate and how they are improving.

In order to achieve this, however, they must ensure that the data provided by their EDM monitors can be trusted. Therefore, highly accurate and robust data, data that will stand up to the very highest levels of regulatory scrutiny i.e. in a legal case must be gathered, analysed and used to inform both best practice and use of "BAT" Best Available Technology in EDM monitoring. This is where the MCERTS standard comes in.

We know that many of the legacy EDM monitors that are already in the ground are no longer fit for purpose. Many will only record data intermittently.

In 2021, the Environment Agency recorded 1,802 sewage monitors as not working all of the time - 12% of all monitors. In 2022, this has risen to a staggering 2,298 sewage monitors recorded as faulty - one in six (16%) of all monitors where sewage discharges took place[2].

As such, this particular challenge of replacement EDM monitors requiring MCERTS accreditation poses both a financial and logistical challenge. If trust and transparency are key, then water companies must invest in EDM monitors that function correctly AND provide accurate data. An EDM monitor that is MCERTS certified is the only option which offers confidence in functionality, performance, reliability, and that it has been accredited by an accepted independent certification body.

Regulatory Landscape

Understanding the regulatory environment is crucial for ensuring compliance and effective EDM monitoring. In the UK, several key regulations and standards govern wastewater management:

Environmental Permitting Regulations: These regulations require water companies to obtain permits for discharging wastewater into the environment. Compliance with these permits is monitored through regular inspections and data reporting.

MCERTS Certification: The Monitoring Certification Scheme (MCERTS) sets standards for environmental monitoring equipment, ensuring accuracy and reliability. From April 2025, all replacement EDM monitors must be MCERTS certified.

[2] https://www.libdems.org.uk/press/release/rise-in-faulty-sewage-monitors-as-water-firms-accused-of-covering-up-environmental-scandal

"The future of EDM monitoring lies in the integration of AI and real-time data analytics. These technologies will enable us to predict and prevent overflow events, ensuring a more sustainable and resilient wastewater management system."

Storm Overflow Reduction Plan: The UK government has introduced a comprehensive plan to reduce storm overflows, with a review scheduled for 2027. This plan mandates significant investments in infrastructure and monitoring systems to meet reduction targets.

Ofwat Regulations: Ofwat, the economic regulator for the water sector in England and Wales, sets performance standards and enforces compliance through inspections and penalties for non-compliance.

Global Comparisons:

Comparing UK regulations with those in other countries can provide valuable insights and best practices:

United States: The US Environmental Protection Agency (EPA) enforces the Clean Water Act, which includes stringent requirements for wastewater discharges. The EPA promotes the use of advanced monitoring technologies and supports initiatives for reducing combined sewer overflows (CSOs).

European Union: The EU Water Framework Directive sets out regulations for protecting and improving water quality across member states. It requires comprehensive monitoring and management plans, similar to the UK's approach.

Australia: The Australian government has implemented the National Water Quality Management Strategy, which includes guidelines for managing wastewater discharges and monitoring environmental impacts. Australia also emphasises the use of innovative technologies for water management.

Cost Benefit Analysis

Investing in MCERTS-certified EDM monitors is essential for ensuring compliance, operational efficiency, and environmental sustainability. This section provides a detailed cost-benefit analysis, comparing the costs associated with two options for implementing MCERTS-certified EDM monitors and the anticipated benefits.

Costing Analysis

Legacy EDM MCERTS Monitor:

- Average Cost: £4,000 per unit

Latest EDM MCERTS Monitor (LIDoTT EDM):

- Average Cost: £1,500 per unit

MCERTS Inspector:

- Inspection Cost: £800+ per day

Legacy Equipment Upgrades to Meet Compliance:

- Average Upgrade Cost: £2,500 per unit

Fines for Non-Compliance:

- Average Fine: £20,000 per incident
- Unlimited penalties introduced for those who pollute the environment

OPTION 1 **Replace 1,000 Legacy EDM Monitors with LIDoTT EDM Monitors**	**OPTION 2** **Upgrade 1,000 Legacy EDM Monitors**
Cost of LIDoTT EDM Monitors: 1,000 units x £1,500 = £1,500,000	Cost of Upgrading Legacy EDM Monitors: 1,000 units x £2,500 = £2,500,000
MCERTS Inspector Cost: £0 (not required)	MCERTS Inspector Cost: 200 days x £800 = £160,000
Total Initial Investment: **£1,500,000**	Total Initial Investment: **£2,660,000**

Benefits

Reduction in Environmental Fines: Implementing MCERTS-certified EDM monitors ensures compliance with regulatory standards, significantly reducing the risk of incurring fines. Given the average fine of £20,000 per incident, avoiding just one fine can justify the cost of several new monitors.

Operational Efficiency: MCERTS-certified monitors provide accurate and reliable data, allowing for predictive maintenance and reducing emergency repairs. This results in lower operational costs and minimised downtime. Predictive maintenance can reduce overall maintenance costs by up to 30%.

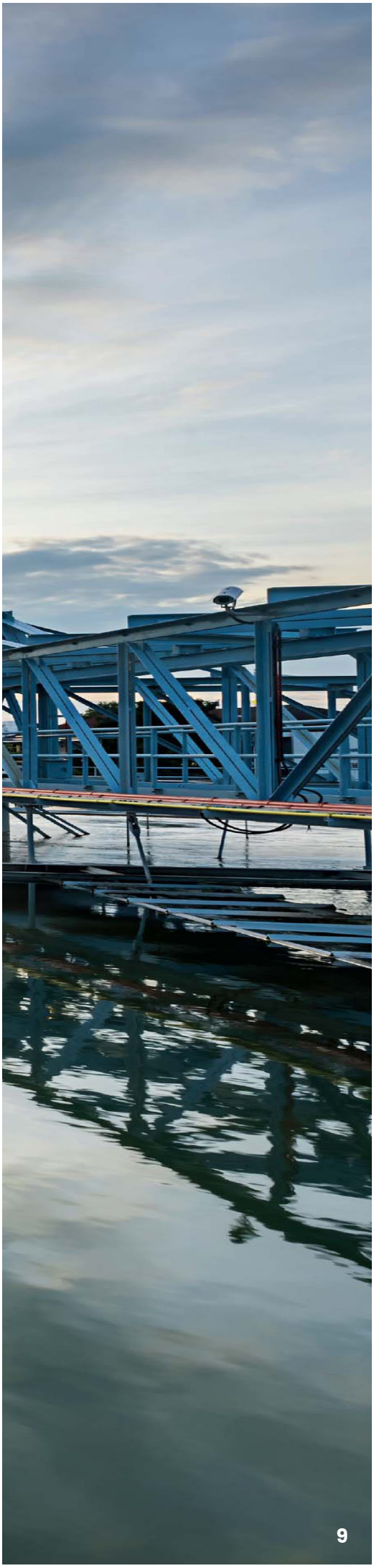
Environmental and Social Benefits: Accurate monitoring helps prevent overflow events, protecting water bodies and ecosystems. This has long-term environmental

benefits, including improved water quality and support for biodiversity. Additionally, transparent monitoring practices enhance public trust and confidence in water companies.

Enhanced Data Accuracy: MCERTS-certified monitors provide high-resolution data, crucial for effective decision-making and regulatory compliance. This data can be used to forecast potential risks, allowing for proactive measures to prevent overflow events.

Detailed Cost Benefit Analysis

OPTION 1 **Replace 1,000 Legacy EDM Monitors with LIDoTT EDM Monitors**	OPTION 2 **Upgrade 1,000 Legacy EDM Monitors**
Initial Investment	
Cost of LIDoTT EDM Monitors: 1,000 units x £1,500 = £1,500,000	Cost of Upgrading Legacy EDM Monitors: 1,000 units x £2,500 = £2,500,000
MCERTS Inspector Cost: £0 (not required)	MCERTS Inspector Cost: 200 days x £800 = £160,000
Total Initial Investment: **£1,500,000**	Total Initial Investment: **£2,660,000**
Cost Savings	
Cost Savings from Reduced Fines	
Avoiding 10 non-compliance incidents annually: 10 x £20,000 = £200,000	
Operational Savings	
Estimated annual savings from predictive maintenance and reduced emergency repairs: £300,000	
Total Annual Savings: **£500,000**	
Return on Investment (ROI)	
Initial Investment: £1,500,000 Annual Savings: £500,000 ROI Period: £1,500,000/£500,000 = **3 years**	Initial Investment: £2,660,000 Annual Savings: £500,000 ROI Period: £2,500,000/£500,000 = **5.32 years**



The Environment is Paramount

Back to the challenge of monitoring those storm overflows. In March 2024, the Environment Agency published EDM monitoring data that is being used to inform each water company's National Storm Overflows Plan. The data helped to identify 9,000 CSOs as 'high risk' and the Government released £10.2 billion to address this. It is expected that this funding will enable water companies to improve those storm overflows and cut sewage spills by 150,000 by 2030.

Water companies must invest more tackling storm overflow pollution. Fact. As we all know, if a water company breaches its permit, it will face legal action and it is required to act urgently to deal with non-compliance. Maintaining and investing in its assets is the only way to achieve the targets set out by the regulatory bodies and, since climate change is already bringing wider variations in rainfall, the water industry has to adapt otherwise multi-million-pound fines and even jail terms for those deemed responsible. Protecting the environment is a priority for the UK Government as the public is increasingly aware and demanding of this. They want water companies to be held to account.

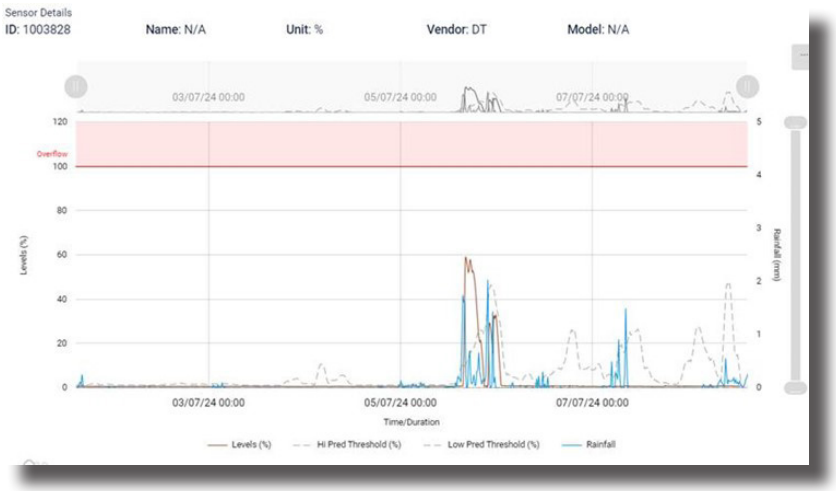
AI and real-time data analytics will revolutionise EDM monitoring, predicting and preventing overflow events.

Extracting Additional Value from EDM Monitoring

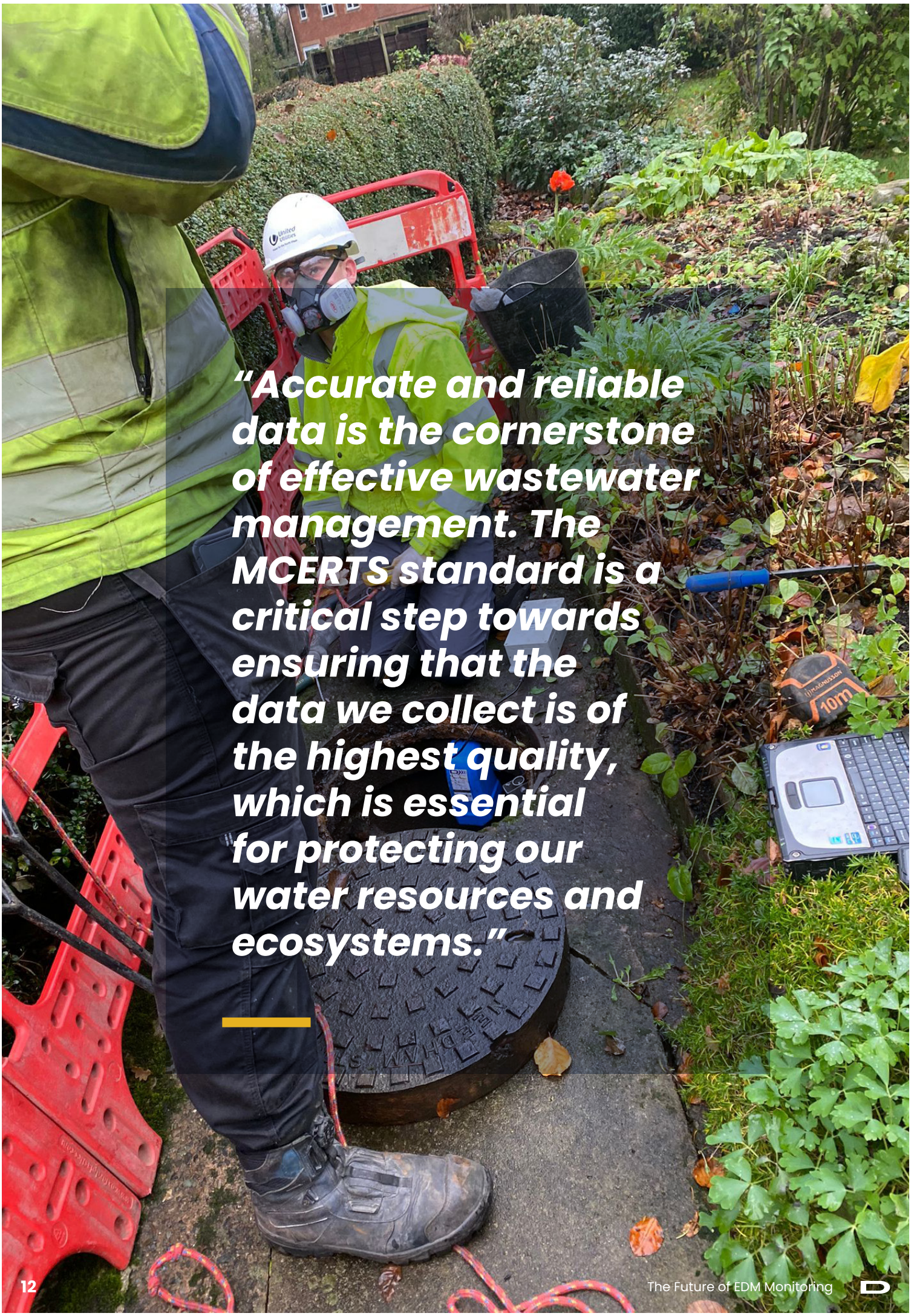
To the environmental point above, the more EDM monitoring in place in the network, the better. The 14,241 monitors already in situ are providing data but we must ensure they're providing millimetre resolution and accuracy which is why water companies must invest in new equipment which is MCERTS certified as mandated for all new and replacement EDM monitors from next April.

Once we know that the EDM monitors are providing robust data, we can use that data to forecast, calculate and estimate the potential risks. Predicting the worst-case scenario, we can then use it to identify the best course of action. When a storm overflow is triggered and it spills into a river or watercourse, knowing exactly how much was spilled and for how long can help in understanding the environmental impact of the receiving water body. This ultimately assist in flood risk management.

The other major key point to make is that monitoring, collecting and analysing the data will aid transparency and help to rebuild public confidence. If the public can see what the water companies are doing to improve their networks, the long-term benefits will be worth the investment.



Level data example



"Accurate and reliable data is the cornerstone of effective wastewater management. The MCERTS standard is a critical step towards ensuring that the data we collect is of the highest quality, which is essential for protecting our water resources and ecosystems."

Environmental Impact

Sustainability Goals:

EDM monitoring plays a crucial role in achieving broader environmental sustainability goals:

Reducing Pollution: Effective EDM monitoring helps identify and mitigate pollution incidents, protecting water bodies and ecosystems. By preventing overflow events, we can reduce the contamination of rivers, lakes, and coastal areas.

Supporting Biodiversity: Clean water is essential for maintaining healthy aquatic ecosystems. By preventing pollution, EDM monitoring supports biodiversity and the preservation of habitats for various species.

Promoting Water Reuse: Accurate monitoring of wastewater systems can facilitate the safe reuse of treated water for agricultural, industrial, and even potable purposes. This reduces the demand on freshwater resources and promotes water conservation.

Impact on Climate Change:

Climate change is increasing the frequency and intensity of extreme weather events, posing new challenges for wastewater management:

Flood Risk Management: EDM monitoring can help manage the increased risk of flooding due to rainfall intensity heavier rainfall and rising sea levels. By predicting overflow events, we can implement measures to protect communities and infrastructure.

Adapting Infrastructure: Climate change requires us to adapt our infrastructure to cope with new conditions. EDM monitoring provides the data needed to design resilient systems that can withstand future climate impacts.

Reducing Greenhouse Gas Emissions: Efficient wastewater management, supported by accurate monitoring, can reduce the energy consumption and greenhouse gas emissions associated with treating and managing wastewater.

Future Trends and Predictions

Several key trends are shaping the future of EDM monitoring and wastewater management:

Data-Driven Decision Making: The integration of advanced data analytics and AI is driving more informed decision-making processes. This trend will continue to evolve, enabling more proactive and efficient management of wastewater systems.

Sustainability Focus: There is a growing emphasis on sustainability and environmental stewardship in the water industry. This includes investing in green infrastructure, promoting water reuse, and reducing the environmental impact of wastewater discharges.

Regulatory Stringency: Regulatory bodies are expected to impose stricter standards and more frequent inspections, driving the need for highly accurate and reliable monitoring systems.

To learn more about how advanced EDM monitoring technologies can benefit your organisation and ensure compliance with upcoming regulations, contact us at sales@detectronic.org or call +44 (0)1282 449 124.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