



BURSTDETECT CLOUD-BASED TECHNOLOGY

WHITE PAPER

Rapid identification of rising main bursts

Preventing rising main pollutions through machine learning



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TECHNOLOGIES 

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Utilities and the rising main sewer challenge



Water companies in the UK are working on pollution reduction strategies with a sense of urgency, in line with industry regulators' expectations of more action.

Requiring particular focus will be rising main sewers — pressurised pipes that carry wastewater from pumping stations to treatment works. These are high risk, critical assets, but with many in the UK ageing and becoming more vulnerable to bursts, historic programmes of proactive maintenance and investment may no longer be enough to keep up with the rate of deterioration.

Often situated in hard-to-reach, remote locations, including beneath rivers, railways and roads, and in environmentally sensitive areas, a burst rising main can have catastrophic ecological impact, with consequences that are unacceptable to customers, regulators and other stakeholders.

Technical and logistical limitations in rising main monitoring can mean utilities are alerted — often by members of the public — hours or even days into the event. This is too late to take action that would prevent a pollution event, with likely outcomes being a costly clean-up operation,

financial penalties, prosecutions and long-term reputational damage.

When it comes to overall environmental performance and protection, the Environment Agency and economic regulator Ofwat have been pushing water companies to meet progressively higher standards. In its 2020–2025 final determinations for companies in England and Wales, Ofwat challenges companies to cut pollution incidents by a third — with the risk of financial penalties if they do not achieve expected performance levels.

This report summarises the latest environmental performance findings from the Environment Agency, highlights recent sewer-related prosecutions and sets out how new data-led technology from Ovarro is helping reduce the risk of serious incidents occurring from burst rising mains.

A commitment to innovate

The water sector recognises the need to innovate to offer greater environmental protection in a cost-effective and sustainable way, with utilities working towards ambitious pollution reduction goals.

In 2020, at the request of the Environment Agency, all water and sewerage companies in England published comprehensive pollution incident reduction plans. These set out new approaches being deployed, with the transformation of data into actionable insight a key theme.

When it comes to rising main sewers, Ovarro's sophisticated analysis of readily available data in near real-time means that much more reliable monitoring is now possible, reducing the risk of environmental harm as a result of bursts.

Environmental performance and expectations



Mounting pressure on utilities to achieve zero serious pollution events has accelerated sewer investment and action planning.

The Environment Agency's environmental performance report 2021 for water and sewerage companies in England called the sector's pollution performance 'shocking', and labelled it as 'the worst we have seen for years'. In a strongly worded foreword, the agency's outgoing chair, Emma Howard Boyd, made several statements, including:

- *"Over the years the public have seen water company executives and investors rewarded handsomely while the environment pays the price."*
- *"The water companies will only stop behaving like this if they are forced to."*
- *"We need courts to impose much higher fines for serious and deliberate pollution incidents."*
- *"Repeat offenders can now expect criminal prosecutions for less serious environmental incidents where once the Environment Agency would have used civil powers. We would like to see prison sentences for chief executives and board members whose companies are responsible for the most serious incidents."*

- *"Water companies exist to serve the public. Their environmental performance is a breach of trust. The polluter must pay."*

The report found that in England in 2021:

- Serious pollution incidents increased to 62, the highest since 2013
- There were eight Category 1 incidents - the most serious— compared with three in 2020
- Seven of the nine water and sewerage companies were responsible for an increase in serious incidents compared to 2020

It also set out performance expectations, up to 2025:

- Trend to minimise all pollution incidents (Category 1 to 3) by 2025 – there should be at least a 40% reduction compared to numbers of incidents recorded in 2016
- Serious pollution incidents must trend towards zero



62

serious pollution incidents in 2021

Water company penalties and prosecutions



Between 2015 and 2021, the Environment Agency (EA) completed 48 prosecutions of water companies in England, securing fines of over £137 million. In 2021:

- Seven pollution prosecutions were completed against five water companies for which £102,490,000 total fines were imposed
- Prosecution fines ranged from £150,000 to £90,000,000
- Nine Enforcement Undertaking (EU) offers were accepted from five water companies, ranging from £50,000 to £368,752. An EU is a voluntary agreement offered by those who have committed a less serious offence. It funds local environmental improvements and requires measures to be taken to correct what went wrong

In October 2022, the Environment Secretary Ranil Jayawardena announced proposals to raise the civil penalty for water companies that pollute the environment by 1,000-fold — from £250,000 to up to £250 million.

Using civil sanctions — variable monetary penalties (VMPs) — which can be imposed directly by the EA rather than the courts can offer a quicker method of enforcement. VMPs can be issued for more serious offences, including when there is evidence of negligence or mismanagement or when there is an environmental impact.

However, the current limit for VMPs handed out by the EA for individual breaches of the rules is £250,000. Increasing the cap for fines up to £250 million will simplify and speed up the process of enforcement by allowing the EA to directly hand out penalties to water companies.

Environment Secretary Ranil Jayawardena said: 'Bigger financial penalties will act as a greater deterrent and push water companies to do more, and faster, when it comes to investing in infrastructure and improving the quality of our water.'



£4 million

fine for a water company who polluted a park, woodland and river with untreated sewage

Prosecution case examples

Recent prosecutions brought as a result of sewer pollution include:

- In January 2022, a water company was fined £233,000 after it admitted to being responsible for a four-day sewage leak that led to the deaths of hundreds of fish in a watercourse
- In May 2021, a water company was fined £4 million after untreated sewage spilled from sewers, polluting a park, woodland and a river
- In January 2020, a water company paid a total of £35,000 after a sewer main burst polluted a nature reserve. The company offered an enforcement undertaking – an alternative to prosecution – following the incident. The £35,000 was to be spent on improving the local environment

Rising discontent Customer expectations

A group of people in swimwear are jumping over a rope on a beach at sunset. The scene is silhouetted against a bright, low sun, creating a warm, golden glow. The people are in various stages of their jump, with arms and legs extended. The background shows a calm sea and a dark, silhouetted shoreline.

A surge in the popularity of open water swimming in recent years has strengthened communities' connections with their local water environment. In the eyes of customers, any ecological harm to watercourses resulting from water company operations — such as a burst or blocked sewer — is unacceptable.

Dedicated campaigners calling for greater protection of surface waters are increasingly influential, political scrutiny into performance is intensifying, and critical headlines about pollution regularly appear in mainstream media outlets. In addition, social media has given community campaigners a stronger voice, reinforcing long-standing messaging from high profile organisations such as Surfers Against Sewage, the Rivers Trust, WWF and the Angling Trust.

In September 2021, *Troubled Waters*, a report for a coalition of charities, including the RSPB, the National Trust and the Rivers Trust, set out the action it believes should be taken to improve

water quality in the UK, one step being 'to stop untreated sewage from reaching our rivers'. The report highlighted the results of a survey of 2,067 people, which found that 83% were concerned about the impact of sewage pollution on freshwater habitats.

Research carried out by the Consumer Council for Water (CCW), published in July 2021, confirmed consumers increasingly recognise the need to look after the environment — and they expect water companies to take meaningful action.



83%

of people are concerned about the impact of sewage pollution on freshwater habitats



BurstDetect: The future of sewer burst detection

Given the urgent need to improve performance, it is unsurprising water companies are working with the supply chain to develop and scale-up innovative solutions.

One such example is BurstDetect, Ovarro's cloud-based early warning system that alerts to possible rising main bursts, and blockages in the upstream gravity sewer, with potential to cause pollution incidents. Through a dashboard accessed via the Ovarro Atrium platform, BurstDetect provides an overview of pumping station system status, historical events and site locations.

If data suggests a possible burst or blockage, an alert is sent to control rooms often within a few hours of occurrence. This ensures operators are able to make swift, informed decisions and quickly allocate resources to limit environmental impact.

This early action can prevent the escape of sewage and resulting environmental damage, ensuring companies fulfil their obligations and avoid fines, regulatory penalties and prosecutions.

The system also monitors pump efficiency trends and alerts to general pump failures.

BurstDetect can be applied to nearly all pumping stations – even those with just basic pump status monitoring – and requires no additional hardware. It aims to achieve 100% coverage in monitoring the network.

The system accepts data at a range of monitoring frequencies with algorithms being applied to understand and characterise 'normal' pumping station behaviour. This training and testing approach to machine learning is becoming increasingly important to water companies, giving them more actionable insight than ever before, utilising data that may not have been fully harnessed otherwise.

With so much data available, it is just not possible for humans to process and analyse the information themselves. By having the correct technology and processes in place, the stage will be set for utilities to rapidly increase their real-time and predictive capabilities.

Automated algorithms, such as those created for BurstDetect, can always be improved and as water companies begin to implement the technology, Ovarro's data scientists work with them to assess the accuracy of alerts. By growing this dataset, through continuous feedback, BurstDetect's algorithms can learn – and the data science teams can continually improve – the technology.



BurstDetect can be applied to **nearly all pumping stations**, requiring **zero** additional hardware.



Successful trials

The system has provided early-warning of a number of burst events. Both during and following the development of BurstDetect, Ovarro undertook trials using real-world data, provided blind by a number of UK water companies. The results demonstrated that the product is able to detect a large proportion of bursts.

In some cases, bursts were detected days or even weeks in advance of current methods. Bursts were also detected on pumping stations where only pump status is being monitored, making the product immediately applicable to almost all rising mains, without the need for capital investment.

Going into 2023, two more live trials were underway.

Anglian Water in world first

In May 2022, Anglian Water became the first utility to adopt BurstDetect, as part of its drive eliminate serious pollutions by 2025. Some 6,000 of the company's pumping stations will be monitored by the technology.

Claire Moore, head of water recycling networks at Anglian Water said, 'With "zero sewage pollution" as one of our 12 ambitious business goals, we have committed to eliminating serious pollutions by 2025, and to reducing the number of less significant incidents by at least 45 per cent.'



Two more
BurstDetect live
trials are underway
going into 2023.

Working with the supply chain to develop innovation and adopt new solutions will revolutionise our ability to meet these goals. Implementing BurstDetect will enable us to respond rapidly should a rising main burst occur, and take proactive action to prevent pollution, and protect the environment.

Claire Moore

Head of water recycling
networks, Anglian Water

Product specification

BurstDetect cloud-based analytics solution

A real-time dashboard to detect rising main bursts with potential to cause pollution incidents.

Suitable applications



Features & benefits at a glance



Real-time monitoring

- Sophisticated analysis of readily available data in near real-time means that much more rapid knowledge of rising main events is now possible



Escape escalated fines and penalties

- Lower the fines and penalties by identifying the potential burst, often within 30 minutes



Communication alerts

- If a potential burst is detected, an alert is sent to control rooms, reducing detection and response times and limiting the impact and cost of the burst



Self-reporting simplified

- Access with ease the system status, historical events and site locations, simplifying the process to deliver accurate reports of incidents



Rapid detection of potential pollution events

- Ability to discover bursts earlier, reducing the number and severity of pollution events and the cost of clean up operations



User alerts to keep you informed

- Incident notification emails ensuring you are informed and able to make decisions to quickly manage pollution events
- Minimising the opportunity of negative publicity following a burst

* Some features may be part of future releases.
Please ask your local representative for clarification.

Early warning detection solution

BurstDetect offers early detection of rising main bursts, helping you to react more quickly to reduce the impact of pollution events.

Easy to integrate, BurstDetect requires no additional hardware and works with a range of monitoring solutions.

BURSTDETECT	Accessed via the Ovarro Atrium platform
OVERVIEW DASHBOARD	Provides a rapid view of the status of recent alerts as well as the system as a whole
BURST DETECTION ALGORITHMS	Over time, BurstDetect learns what is normal for each pumping station and rising main, improving the quality of burst detection
COMMUNICATION ALERTS	Incident notifications ensure you are informed and able to make decisions to swiftly manage and prevent pollution events. Identified within an hour of occurrence
SUPPORT HELPDESK	Ovarro helpdesk and support
ONLINE AND VIDEO TRAINING	Dynamic content to support with understanding BurstDetect and how it can help your organisation
REGULAR UPDATES	Automatically updated as new features are added
CUSTOMER DATABASE CONNECTION	Our implementation team will help set up a secure data connection from your monitoring systems



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BRIGHTER TOMORROW

HEAD OFFICE, UK

Rotherside Road, Eckington,
Sheffield S12 4HL, United
Kingdom
+44 (0) 1246 437580

CHESTERFIELD, UK

ControlPoint House, Carrwood
Road, Chesterfield S41 9QB,
United Kingdom
+44 (0) 1246 262080

DENMEAD, UK

Parklands Business Park,
Denmead, Hampshire PO7 6XP,
United Kingdom
+44 (0) 23 9225 2228

REIGATE, UK

Foundation House, 42–28
London Road, Reigate, Surrey
RH2 9QQ, United Kingdom
+44 (0) 1306 742772

**STEENWIJK, THE
NETHERLANDS**

Woldmeentherand 5, 8332 JE
Steenwijk, The Netherlands
+31 88 003 2900

WATERLOO, BELGIUM

Waterloo Office Park — Building
M, Drève Richelle 161 box 35,
1410 Waterloo, Belgium
+32 02 387 4259

LYON, FRANCE

8 rue du Colonel, Chambonnet,
69500 Bron, France
+33 (0) 4 72 81 60 60

KUALA LUMPUR, MALAYSIA

7-1, Jalan Flora 2/1 Bandar
Rimbayu, 42500, Telok Panglima
Garang Selangor Darul Ehsan,
Malaysia
+60 (0) 3 5525 2895

MELBOURNE, AUSTRALIA

Waterman Business Centre
Suite 002, 44 Lakeview Drive,
Scoresby VIC 3179
+61 03 8544 8544

sales@ovarro.com

www.ovarro.com/burstdetect