Applying machine learning at rising mains and sewage pumping stations

21 July 2025

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Welcome & agenda

Wessex Water attendees
Richard George (Water Recycling - Networks) – ***Challenge lead***
Katherine Mining (Strategy & Regulation) – ***Marketplace oversight***
Jody Knight (Asset Technology)
Paul Mcluckie (Innovation)
Jim Stevens (Procurement)

Our Wessex Water Marketplace approach	Katherine
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Submitting a proposal	Katherine
Proof of concept (POC) trial	Richard
Questions	Katherine / Richard
Next steps & close	Katherine

Housekeeping

- Please remain on mute to avoid background noise.

- Questions:
  - Add questions to the Chat – we will answer as many as possible during the session.
  - Email any further questions to marketplace@wessexwater.co.uk on or before Wednesday 23 July.
  - We'll publish answers to all questions (where appropriate) by the end of July.

- **Please be aware that the session is being recorded for publication on the Marketplace website.**

- Slides and the session recording will be published on the Marketplace website by the end of this week.

- Please raise any technical issues using the Chat.

Our Wessex Water Marketplace approach

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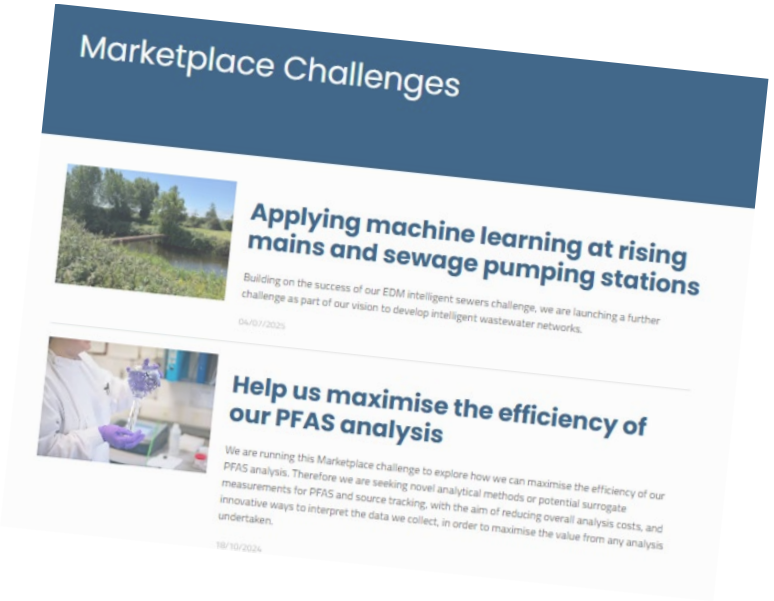
The Wessex Water Marketplace

- new, disruptive ideas
- a wider pool of partners
- making our data open to the market
- keeping an open mind about solutions and delivery options

… delivering our outcomes more effectively and efficiently



- **challenges**

  specific business challenges that we pose to the wider market

- **data sets**

  data supporting these business challenges or standalone data sets of external interest

- **blog**

Recent challenge example: PFAS

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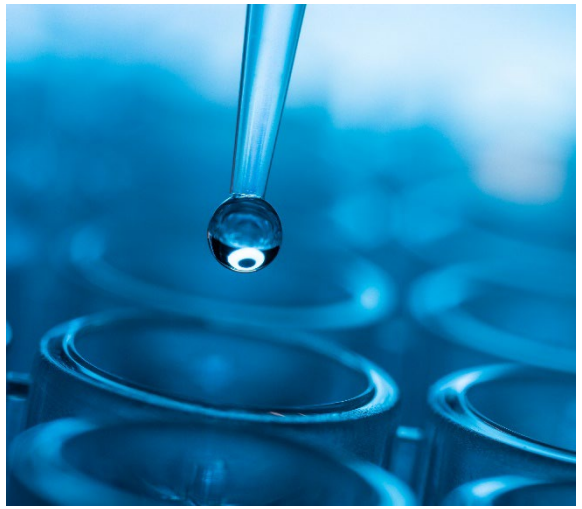
- per-and poly fluoroalkyl substances
- long-lasting and ubiquitous in the environment
- monitoring is challenging e.g. expensive
- **Marketplace challenge**, looking for:
  - novel analytical methods
  - innovative ways to interpret data we collect



- beginning pilot work with one supplier from the challenge
- revisiting certain other proposals once more PFAS data is available

Rising mains challenge – context

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Context – rising mains & SPSs

- Sewage pumping stations (SPSs) & pressurised pipes called rising mains – used to transfer wastewater uphill.

- SPS operation:
  - wastewater arrives and accumulates in ‘wet well’
  - wet well level reaching certain threshold triggers pumps to run
  - wastewater pumped out of wet well through rising main

- Various parameters measured at SPSs (e.g. wet well level).

SPS diagram

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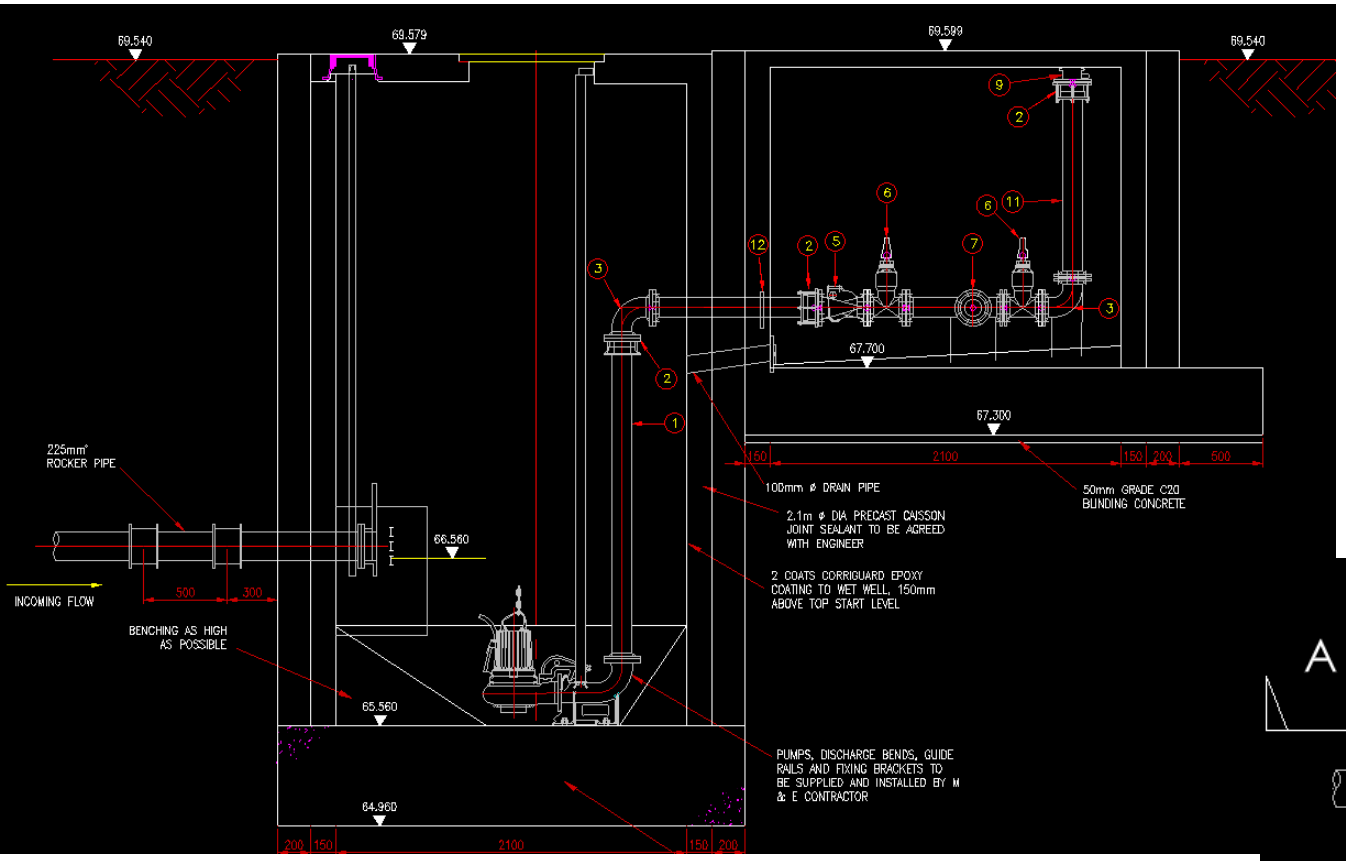
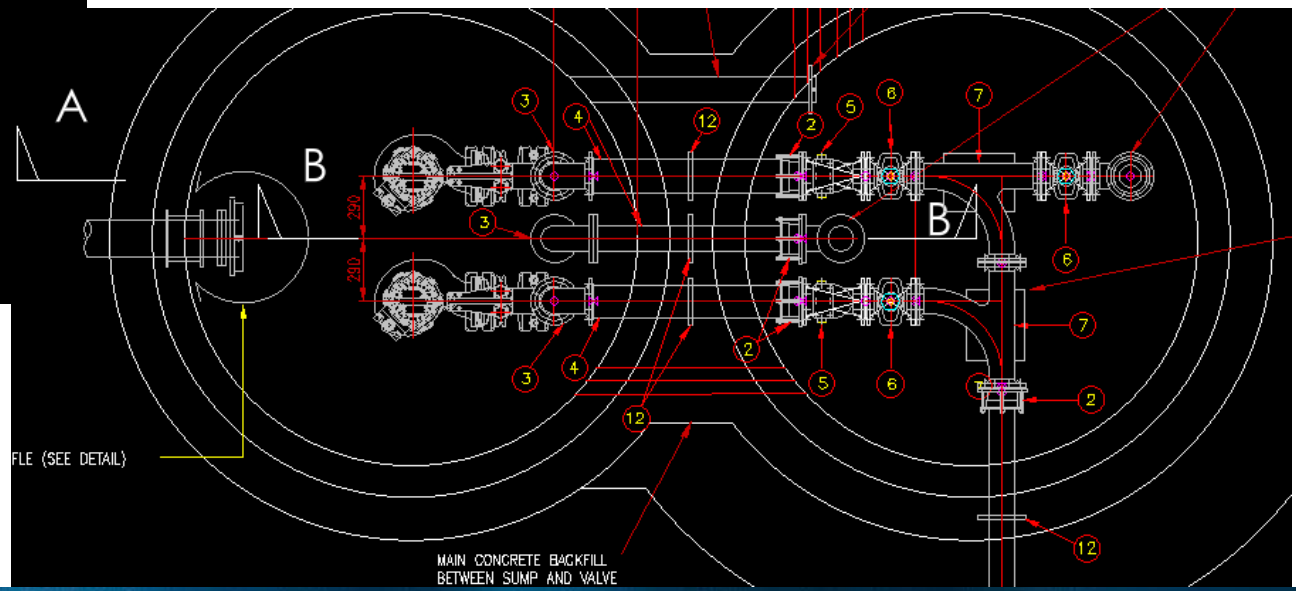
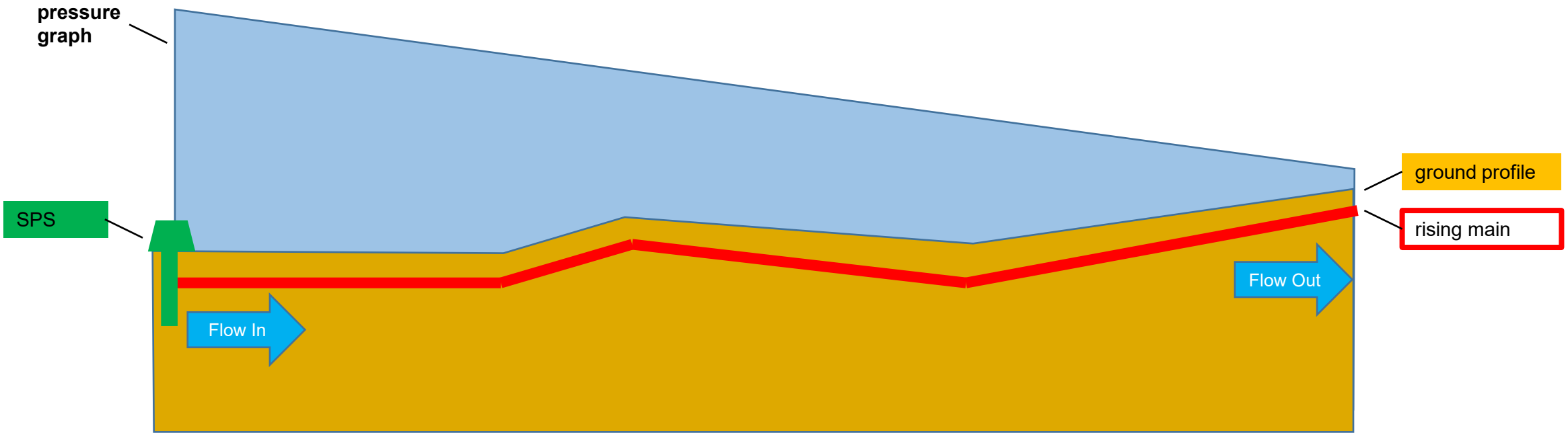


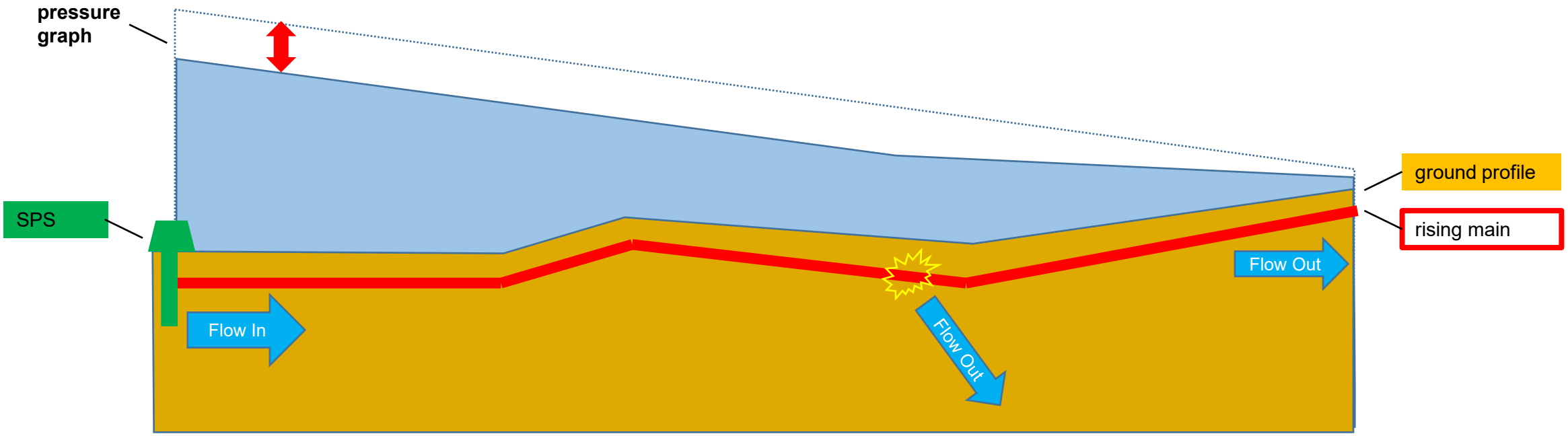


Simplified hydraulics



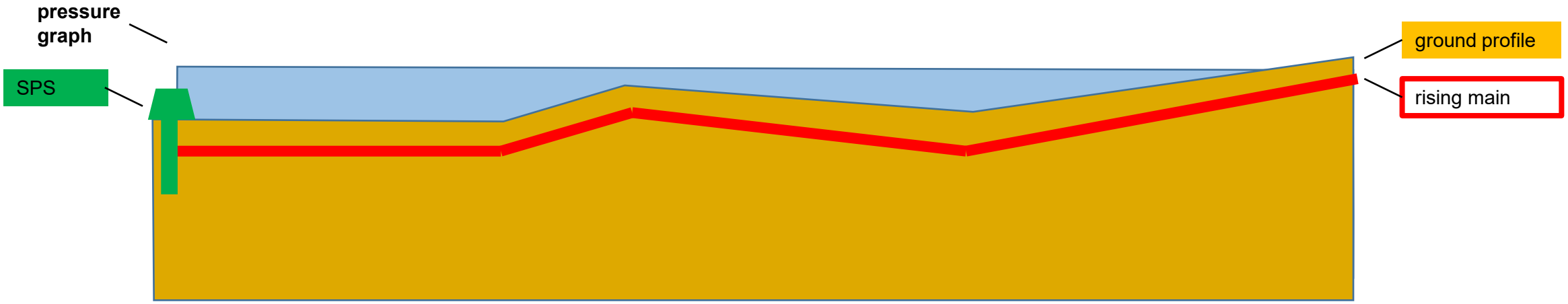
Pump Station running – normal operation

Simplified hydraulics



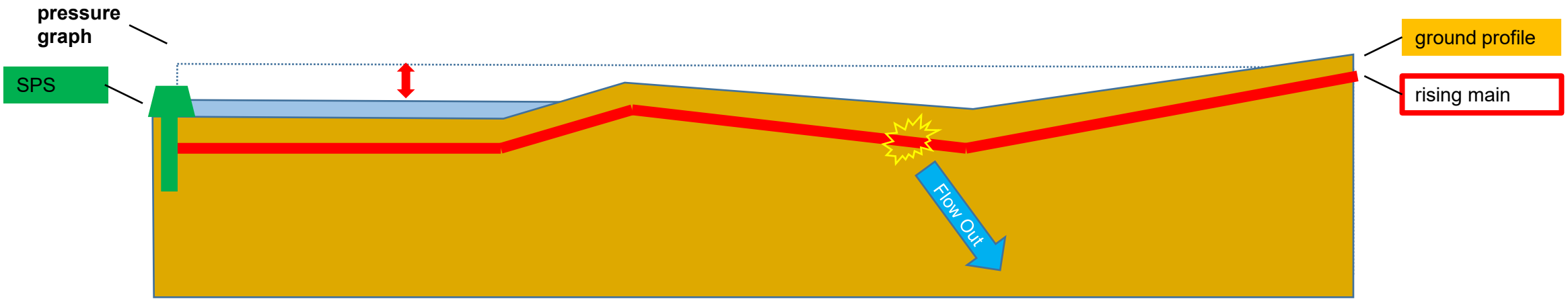
Pump Station running – burst

Simplified hydraulics



Pump Station off – normal operation

Simplified hydraulics



Pump Station off – burst / leak

Other Failure Types

Leaking air valve

Blocked pump

Jammed non-return valve

Context – bursts & SPS issues

- Rising main bursts can cause flooding & pollution.
- Burst may not be obvious from surface – telemetry data is key to detection.
- For major issue at SPS, parameters breach threshold, generating telemetry alarm. Minor issues may not breach alert threshold but can develop into service failures.
- Current approach: in-house analytics, but limited by level of triage involved.

Rising mains challenge – overview

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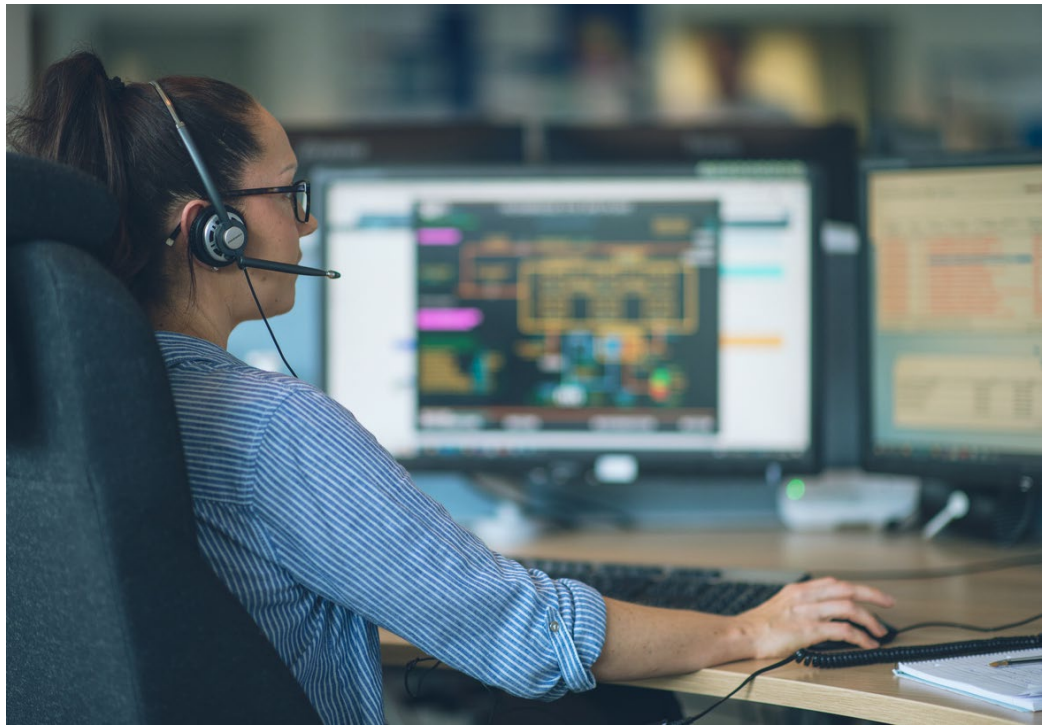
What are we looking for?

A machine learning solution that:

- uses real-time wastewater telemetry data to identify when behaviour of an SPS or rising main deviates from the expected range for the prevailing conditions
- generates an alert that could be transmitted to our network monitoring team.

… so we can:

- more rapidly identify bursts and SPS failures that occur
- identify developing or imminent issues and intervene



How the challenge will run

- **Asset information and historical telemetry and rainfall data** published for 24 SPSs
- Inviting suppliers to use this to develop and demonstrate predictive machine learning capability
- Proposals due on or before 24 September 2025
- We'll assess which proposals to take forward to trial (up to three)
- Proof of concept (POC) trial using a near real-time data feed to test solutions – funding of up to £15,000 per POC
- If trials successful, ambition to proceed to procurement phase

Submitting a proposal

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How to submit

- Email to marketplace@wessexwater.co.uk on or before 24 September 2025

- Full details in additional information document

- Include:
  - details of the system you propose to use
  - outline of any funding requirements for the POC (up to £15,000)
  - confirmation that system is available for purchase and implementation following successful POC
  - demonstration of capability using our historical data
  - details for each bullet point in our ‘further assessment criteria’ on page 3/4 of additional information document.

- Keep submissions concise (20 pages absolute max.)

Our initial assessment of proposals

Aim of assessment: determine who to take forward to POC stage

1. Desktop review:
    - key assessment criteria: **demonstration of capability using our historical data**
    - **further assessment** criteria:
        - case studies of any UK or worldwide use (or similar applications)
        - data and information security
        - compatibility / connectivity with Wessex Water systems
        - indicative long-term costs and support
        - feasibility of deployment
        - commercial benefits

2. Face-to-face meetings for shortlisted suppliers:
    - currently planned for November 2025
    - ideally with live walkthrough of working system using published historical data

Proof of concept (POC) trial

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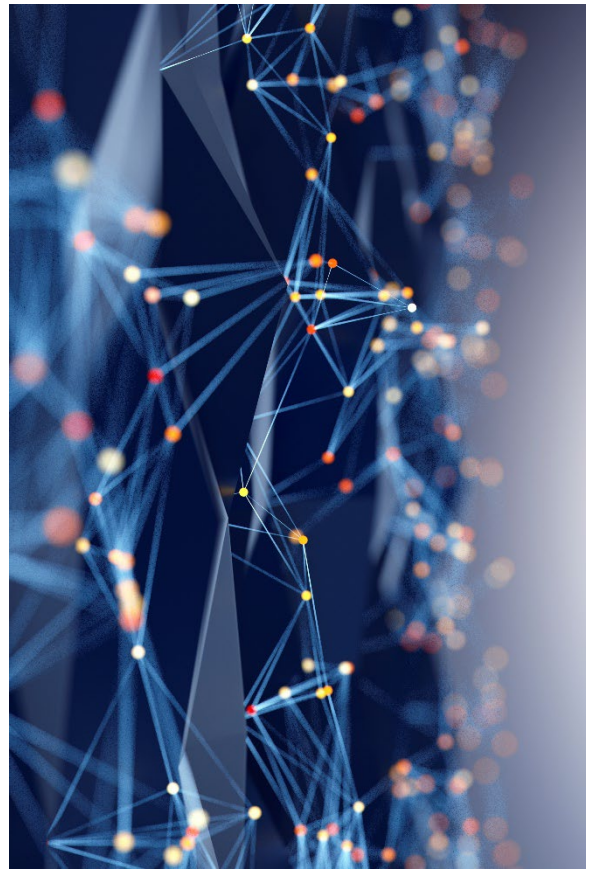
How the trial will run

- 3-month period, likely starting early 2026

- Covering the 24 sites from original data publication

- Data provided:
  - near real-time telemetry data feed (SPS wet well level & run-stop data, rising main pressure & flow data)
  - rising main route and elevation profile (**not** anonymised)
  - historical and predicted rainfall data at near real-time (if on-premise solution, otherwise supplier to provide)
  - rising main diameter – as per original published file

- Assessing how solutions use this near real-time data to generate alerts when SPS or rising main behaviour deviates from expected range

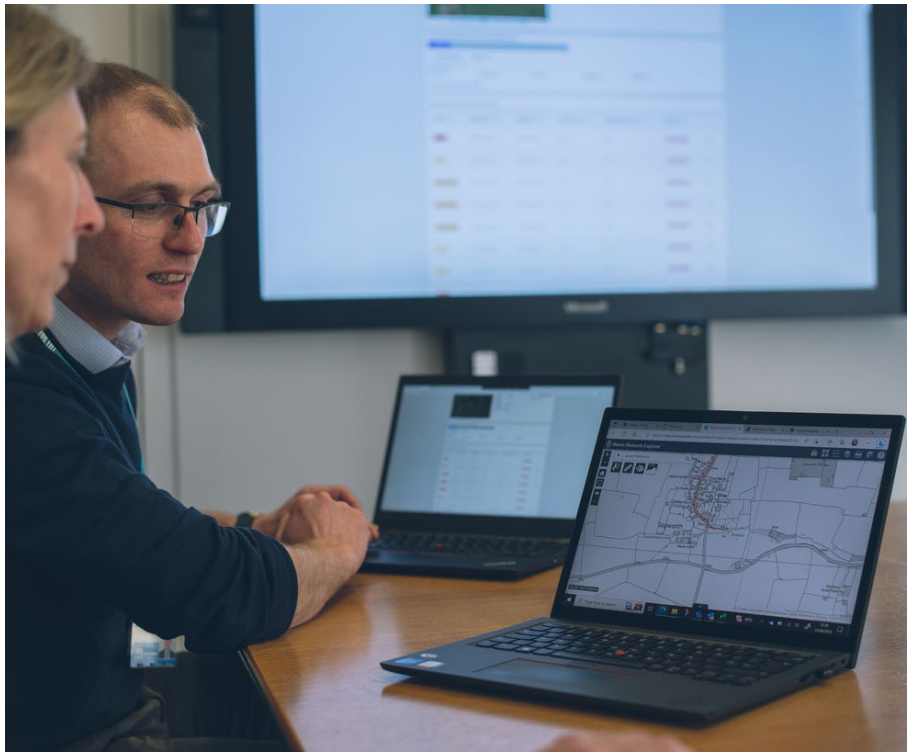


How we will assess the trial

Metrics based around:

1. Alert volumes and accuracy
2. Alert severity categorisation
3. Alert latency
4. Reliability
5. Machine learning capability
6. Compatibility / connectivity
7. User experience
8. Other system functionality

Further detail in **additional information document**



If trials are successful, our ambition is to proceed to a procurement phase.

Questions

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Next steps & close

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Thank you for joining

Next steps following this session

- **Q&A:** Email any further questions to marketplace@wessexwater.co.uk on or before Wednesday 23 July. We'll publish answers to all questions (where appropriate) by the end of July.
- **Proposal submission:** On or before 24 September 2025, email to marketplace@wessexwater.co.uk
- **Initial assessment:** We'll review proposals and invite shortlisted suppliers to face-to-face meetings to select trial participants. We'll give feedback to all suppliers.
- **POC trial:** 3-month period, likely starting early 2026

You can sign up to our Marketplace mailing list to hear about new challenges, datasets and other news from the Marketplace.