



Badger Meter

Network Calming

Protecting network assets, reducing leakage and bursts

Introduction

Bursts and leaks are a perennial challenge for the water sector

£225m was spent on leak and burst repairs in 24/25

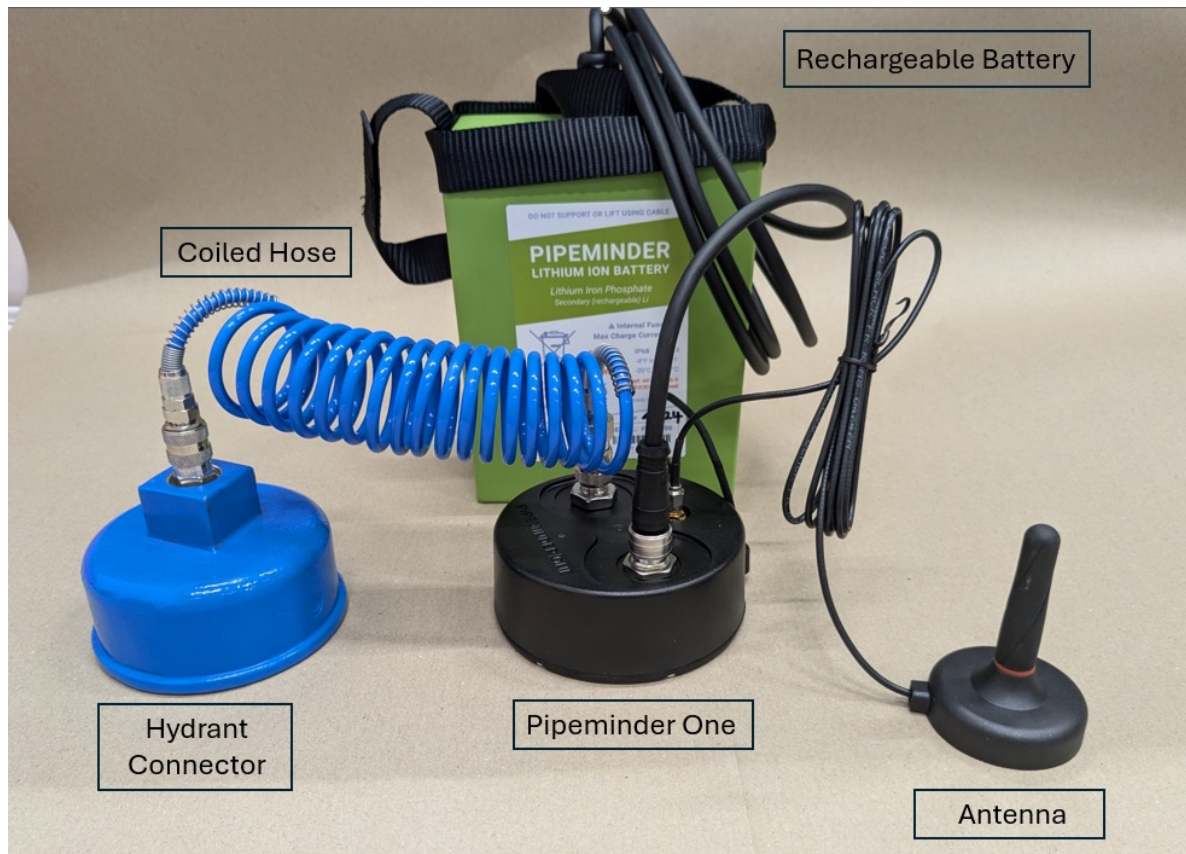
Large diameter pipes present a disproportionate risk

Mitigation is key to reducing the risk of reoccurrence

... so how do we use sensors and data to inform change?



Pipeminder 1



Introduction – Content

- Insight from data
- Principles of network calming
- Delivering results
- Booster reprofiling
- Reservoir inlet control
- Measuring the benefit
- What next....



Single data sets gets only gets you so far

Asset performance modelling in Skewb Novus provides the delivery team with a unique insight into where network pressure variation is likely to be causing issues and a risk based approach to pipe failures.

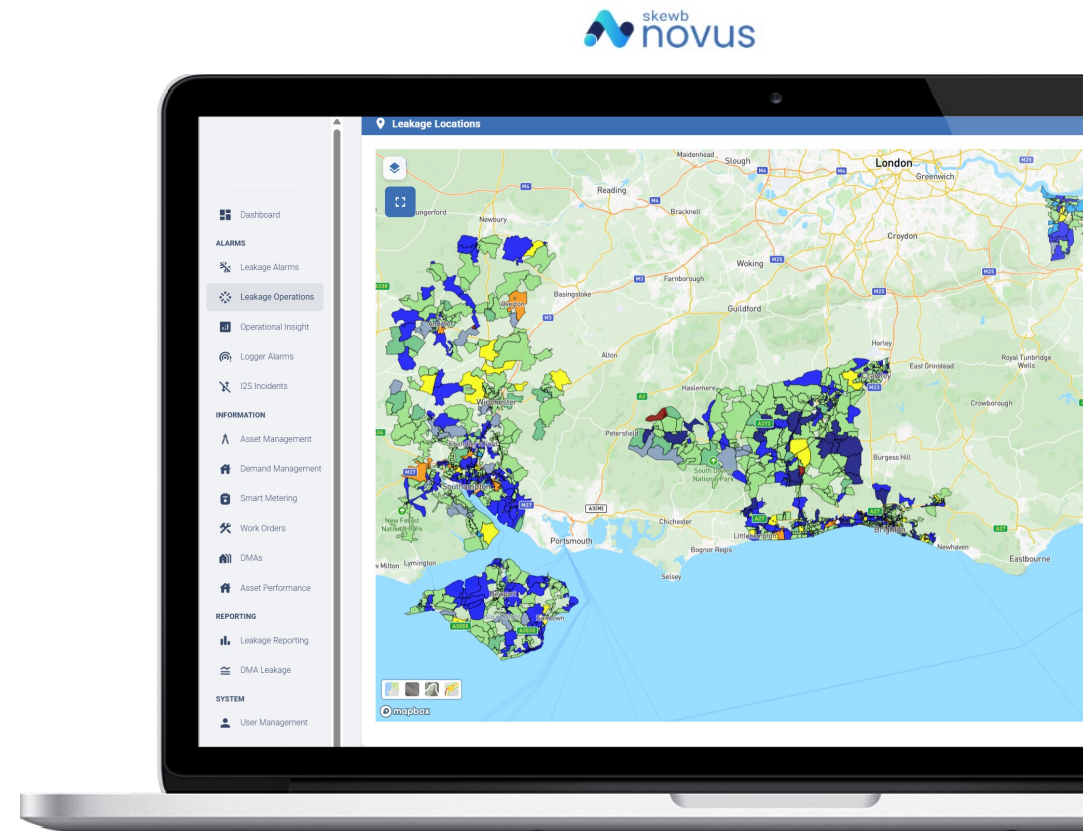
Layering these insights together provides a unique insight into where a calm network solution is likely to bring the greatest return on investment.

The modelling utilises asset data such as:

- Pressure and flow data
- Pipe material
- Pipe Age
- Customer demand

And combines it with a wealth of externally sourced data including:

- Soil type
- Soil moisture
- Traffic and travel data
- Road categorisation

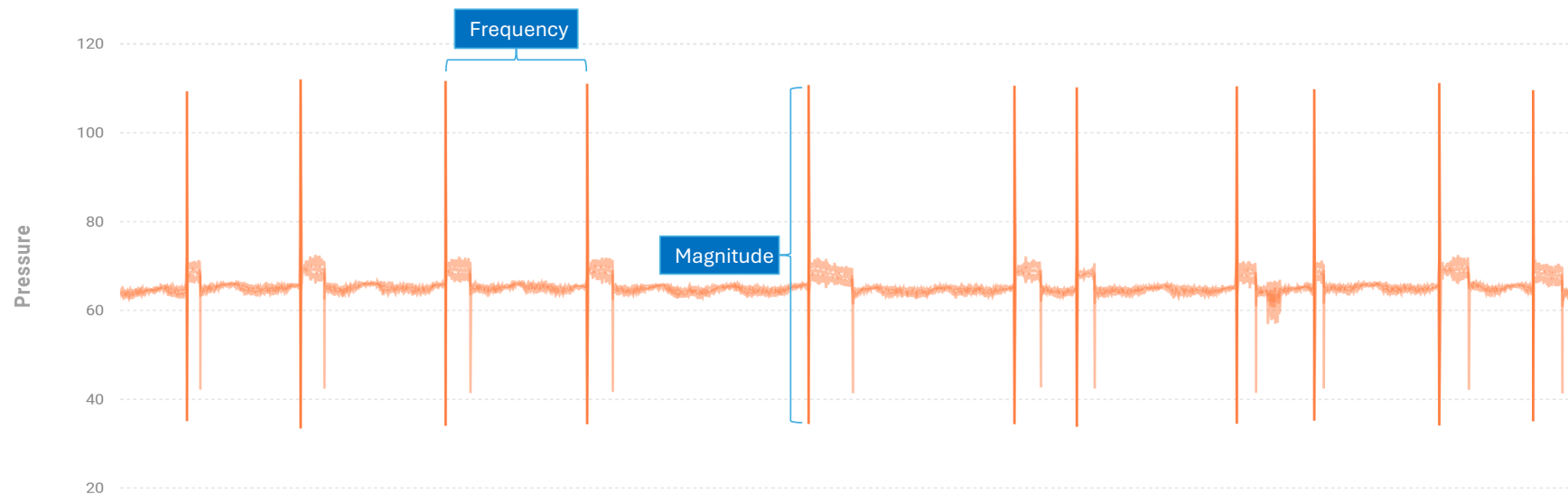


Principles of Network Calming

- We have an ageing network
- We have a challenging leakage reduction target
- Our customers expect water to be there 24/7

Burst and leak reoccurrence are directly linked to frequency and magnitude of pressure change.

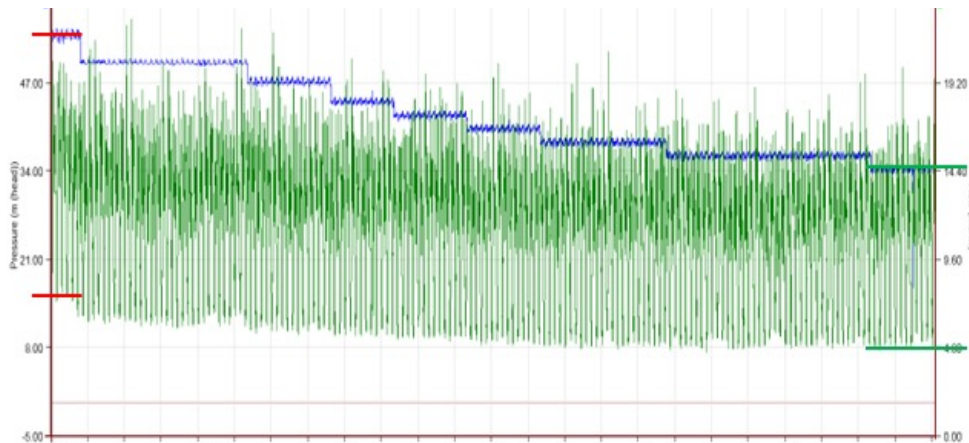
N.B. The link to reducing absolute pressure has been shown to be relatively short term.



Pressure Events

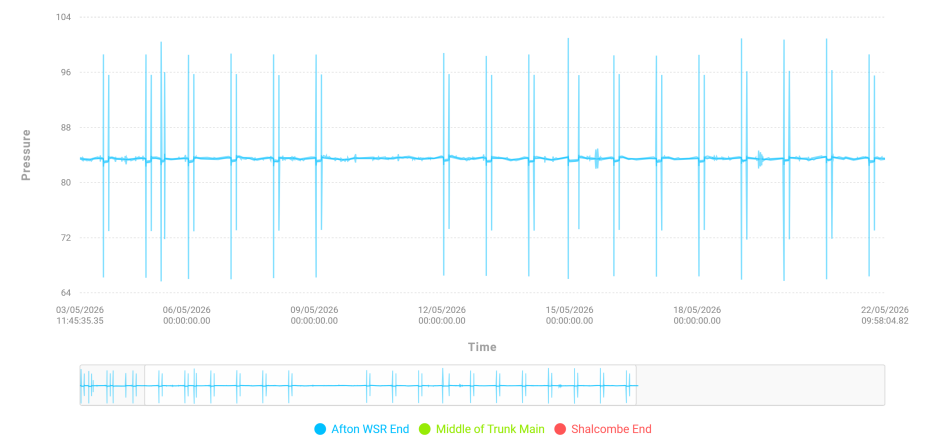
Long-cycle

- Pressure change happens over hours and minutes
- Driven by demand change
- Typically, low frequency
- Resolved through the application of closed-loop pressure control



Short-cycle

- Pressure change happens in seconds
- Driven by rapid changes in asset conditions
- Frequency varies depending on the source
- Resolved through the changing network control

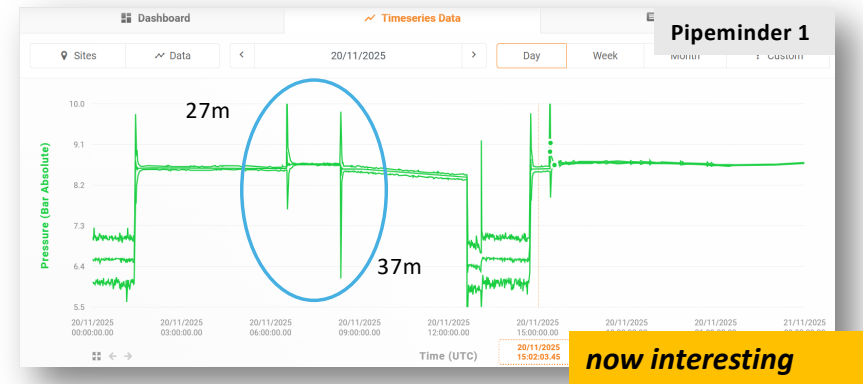


Mean Pressure Data vs Pressure Range (Max,Min)



Standard pressure logging has typically provided an optimum sample rate of 1 per minute.

Pipeminder 1 overlays maximum, minimum and average pressure data to provide a clearer view of what is happening at that location.



Clustering of Pipeminder 1 loggers then allows correlation of event location.



Pressure Control Principles – Long-cycle

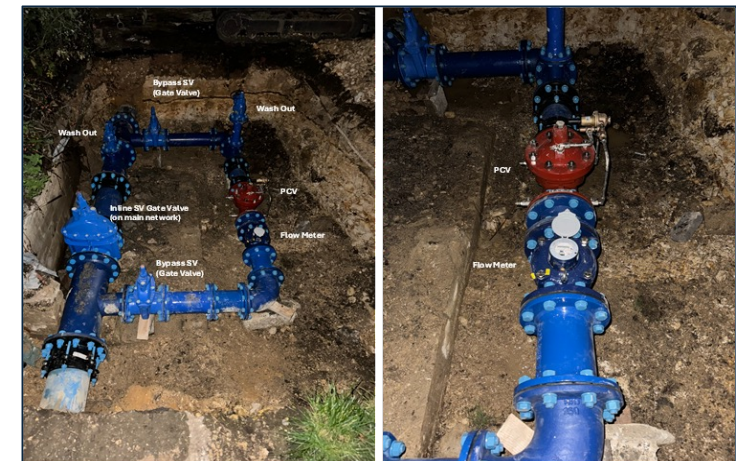
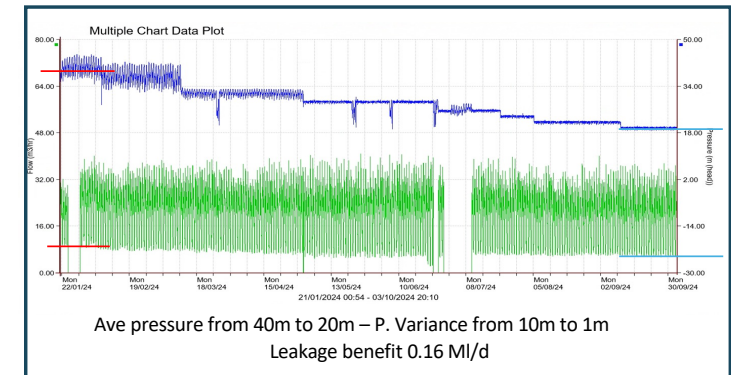
Achieved

- Over 6 years of leading Smart Pressure Control programme for Southern Water.
- 500 schemes designed, installed, commissioned & optimised.
- 32 MI/d measured leakage benefit.

Approach

- Structured project approach, identify, design, client sign-off, schedule, construct, commission, optimise, measure, hand back.
- Insight through digital solutions
- Prioritised activity, bringing value to the top.
- Policy and process design, streamlining and learning.

To-date
32 MI/d Benefit
>75 mains burst mitigated per year



Pressure Control Principles – Short-cycle

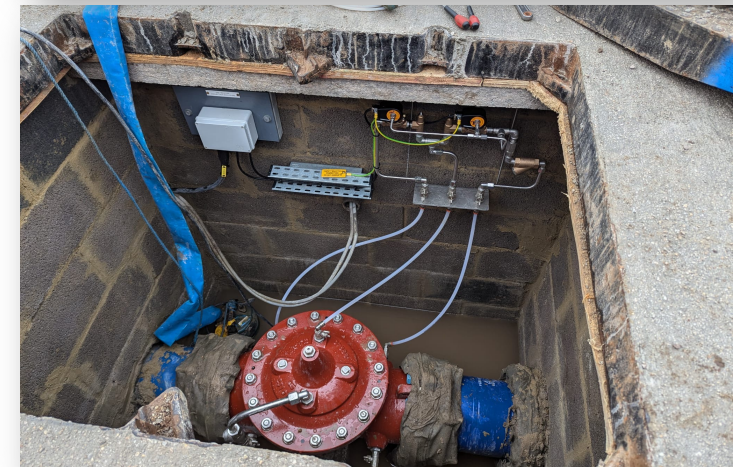
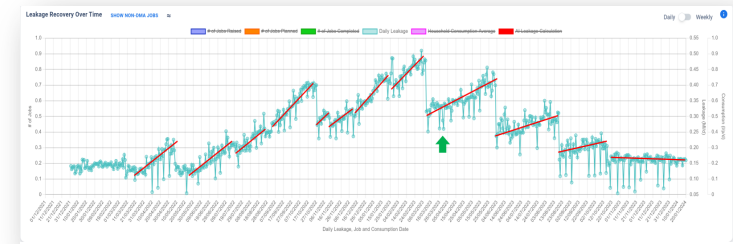
Achieved

- 3rd year of leading Transients programme for Southern Water.
- 40 schemes designed, installed, commissioned & optimised.
- 4 MI/d achieved (measurable and auditable)
- 60 mains burst per year mitigated.

Approach

- Structured project approach, identify, design, client sign-off, schedule, construct, commission, optimise, measure, hand back.
- Prioritised activity, bringing value to the top.
- Policy and process design, streamlining and learning.
- Identifying bespoke solutions.
- Engaging with NHH customers.

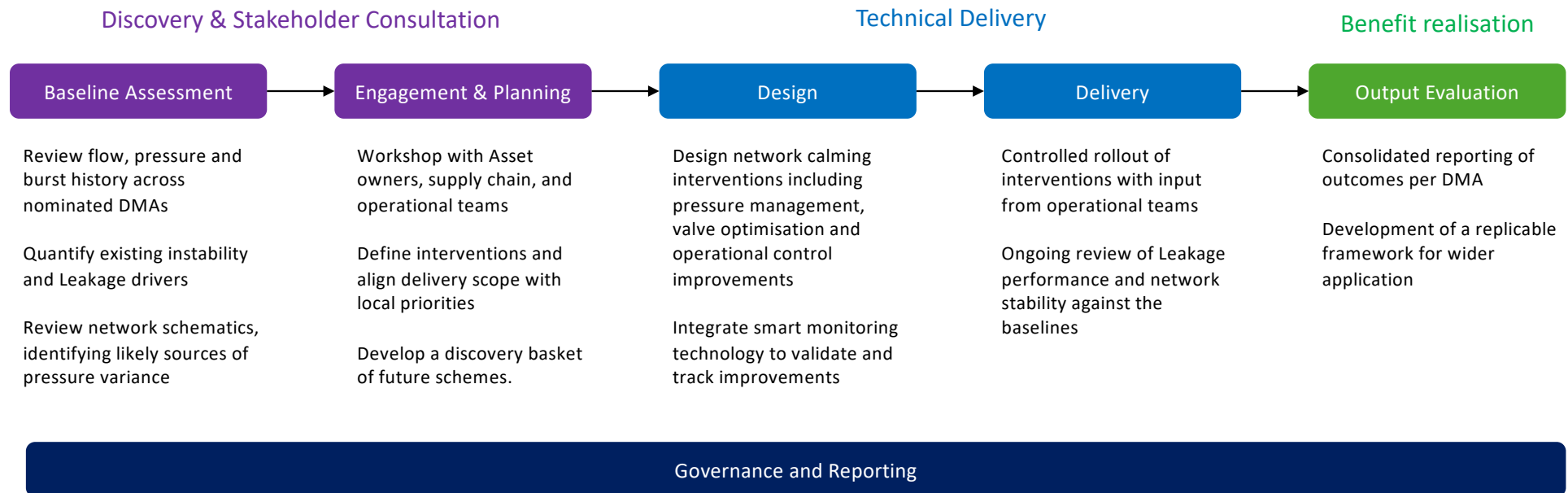
Benefits
4 MI/d to-date
 60 bursts avoided | £400k/yr Opex savings



Principles of Delivery

Skewb applies a proven methodology that has consistently delivered leakage reductions and burst improvements for water companies in the UK.

Our structured approach to identify and drive delivery of the best solutions is cost-efficient and delivers performance improvements for a total cost of less than £1M per MI/d of measured leakage saving, while building capability and evidence for sustainable performance.



Transient Mitigation – Booster Reprofile

Problem

- Recuring burst in the network
- Leakage find and fix losing the battle

Solution

- New control philosophy at the booster

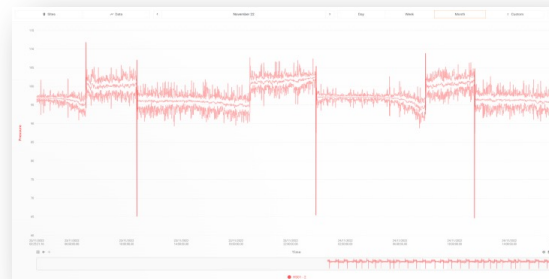
Cost

- £5,000

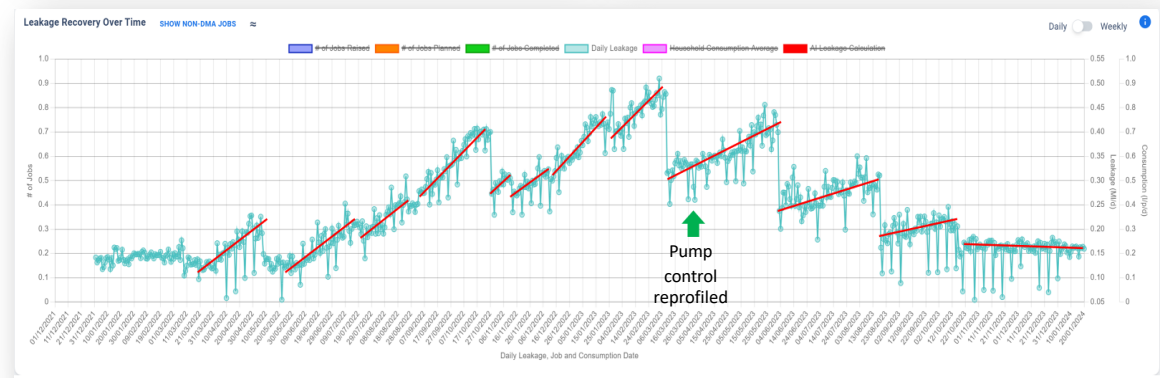
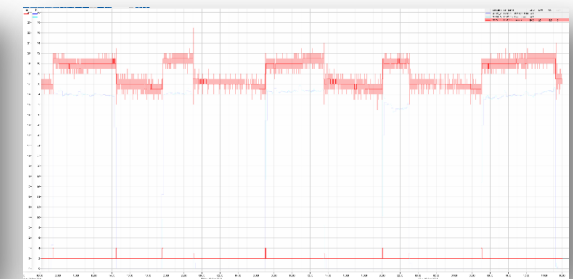
Benefits

- 0.33 Ml/d of measurable leakage saving
- 6 bursts per year mitigated
- £35,000 of Opex saving per year

Before



After



Transient Mitigation – Reservoir Inlet

Problem

- Recurring burst in the network
- Leakage find and fix losing the battle

Solution

- New control valve on inlet to reservoir

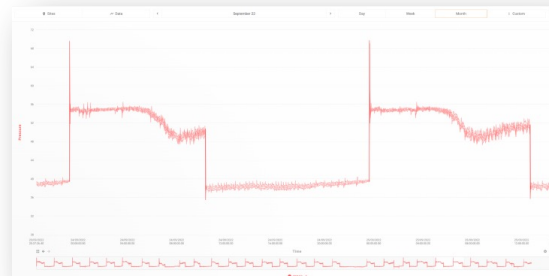
Cost

- £250,000

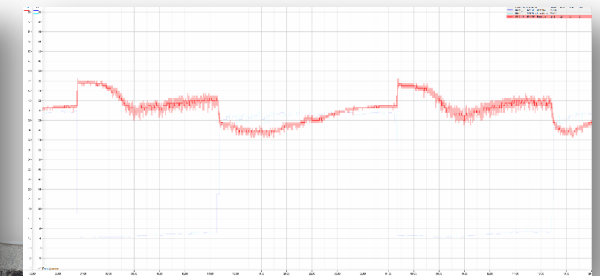
Benefits

- 0.27 MI/d of measurable leakage saving
- 9 bursts per year mitigated
- £50,000 of Opex saving per year

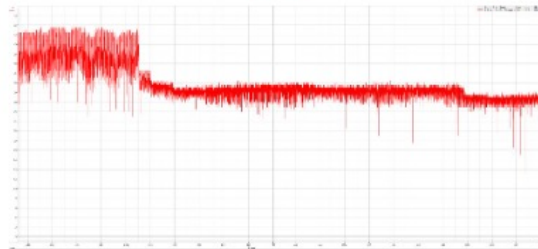
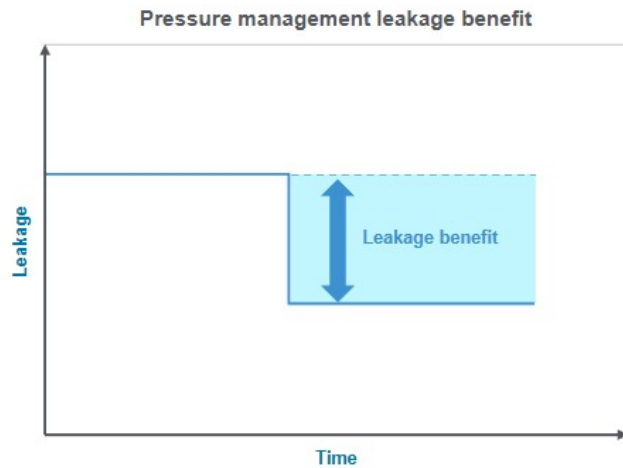
Before



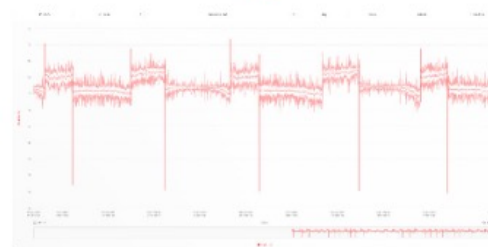
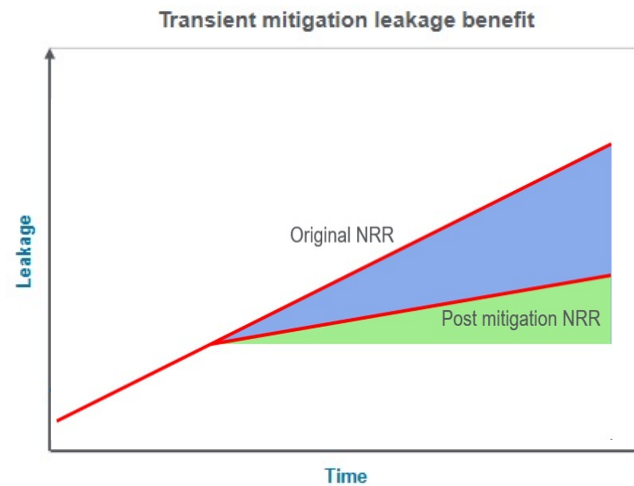
After



Principles of Benefit Measurement



Pressure inside a newly pressure managed DMA, SL60.



Pressure transients created by Durrington WBS, recorded in DMA, HS01.

Pressure Management

- Measurable response directly correlates to the reduction in pressure

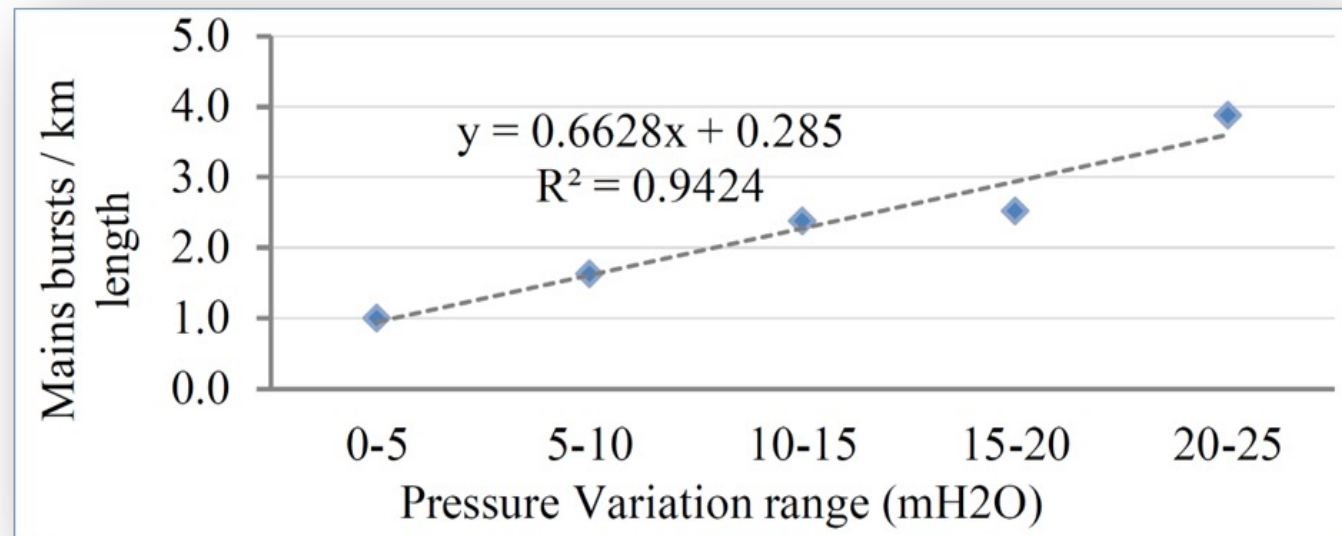
Transient Mitigation

- Projected reduction in NRR
- Estimated post deployment
- Remeasured after 12 months

Principles of Benefit Measurement Burst Reduction

Burst Reduction

- Burst reduction on metallic pipes is directly related to a reduction in the frequency and magnitude of pressure variance.
 - Baseline positions was built around studies from academic papers.
 - Each year the project team return to their initial estimates and measure the actual benefit achieved
- Year on year the schemes have proven to perform in line with or beyond the forecasted benefits.



Principles of Benefit Measurement – Financial Saving

Components of financial saving

- Cost of water production (£/Ml)
- ODI leakage penalty
- Find and Fix costs
- Supply interruptions ODI (over 3 hours and over 12 hours)
- Affected properties supply interruption GSS payments
- Alternative water costs
- Repair costs
- Consequential damage costs
- C-Mex impact



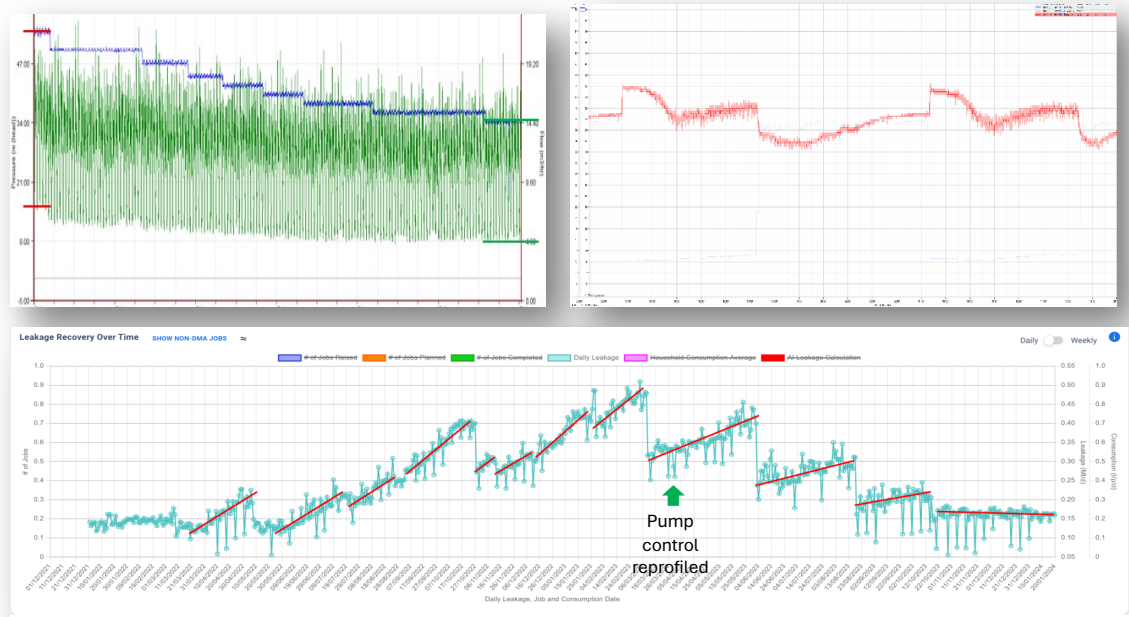
Conclusion and Next Steps

Conclusion

- Good technology provides quality data
- Data stacking provides insights
- Solution design and delivery can be done at pace
- The benefits can clearly be articulated

Next steps

- Continue to deliver for our water company clients
- Further optimisation of control
- Influence design philosophy of new networks
- Cross over into wastewater pumped systems





Thank you

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Questions?



Outcome
Focused



Integrity



Simplicity



Citizenship



Co-create &
Collaborate



skewb