

26th Annual Leakage Conference

BIRMINGHAM
MONDAY 24 NOVEMBER 2025
TUESDAY 25 NOVEMBER 2025

Awareness & Locate (PALM), Mend (PALM)

Organised by
lodestar

Media partner
THE UK WATER REPORT
POLICY | REGULATION | FINANCE

Welcome back



Bob Taylor

Chief Executive Officer

Portsmouth Water

Housekeeping

- Turn **Phones/devices** to silent or off please
- **No fire alarms** expected
- **Q&As** – Raise your questions through:
  - **In the room – Roving microphones**
  - **Livestream – via Slido**
- We will also be **seeking your views through SliDo polls**
  - **Get the slido app – use the handle #4474324 (info sheet on your table)**
- **Feedback forms**
  - **Hard copy within your Event Guide and QR code on your table to access online (editable PDF or online form)**

Mend (PALM)

Ofwat Innovation Fund: No-dig leak repair update



Tim Evans

Lead Water Network Scientist

Thames Water

No-Dig Leak Repair – An update

Ofwat Innovation Fund WBC4 Transform Project

Tim Evans – Lead Water Network Scientist

26th Annual Leakage Conference, 24-25 November 2025
Birmingham

No-Dig Leak Repair

Agenda

1. Introduction to the project
2. Phase 1 progress
3. Next steps



No-Dig Leak Repair

OIF WBC4 Transform project headlines

- £6.7M project running from October 2024 to January 2029
- Funders: Ofwat Innovation Fund, Thames Water, TfL Lane Rental Scheme, Southern Water, Dŵr Cymru Welsh Water

Collaboration

- Lead water company: Thames Water
- Principal delivery partner: Synthotech [with ALH Systems and WRc]
- Other partners: Affinity Water, Anglian Water, Dŵr Cymru Welsh Water, Northumbrian Water, SES Water, Southern Water Uisce Éireann Irish Water, Yorkshire Water, University of Sheffield

Project phases

- Phase 1: Concept Development (TRL4)
- Phase 2: Pilot Demonstration (TRL5)
- Phase 3: Whole System Demonstration (TRL6)
- Phase 4: Field Trials (TRL7)
- Phase 5: Knowledge Transfer (throughout)

No-Dig Leak Repair

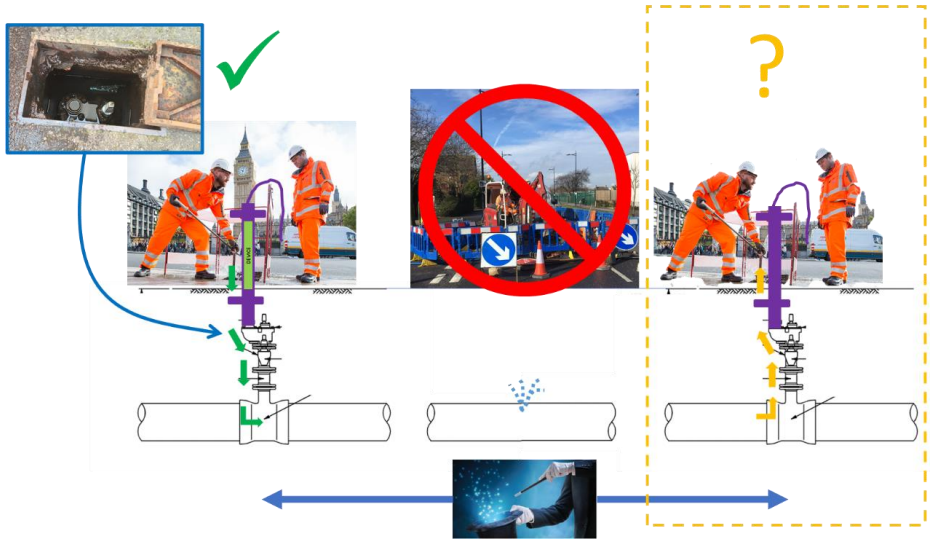
What are we aiming to achieve?

- We're seeking a technology that can:
  1. enter a water main via existing/standard hydrants
  2. locate and identify the leak
  3. execute an internal repair and test it

  and which:
  - meets strict water quality requirements
  - requires no excavations
  - won't need significant supply interruptions
  - minimises transport disruption
  - can be completed faster than dig repairs
  - is competitive on cost, H&S, carbon, etc

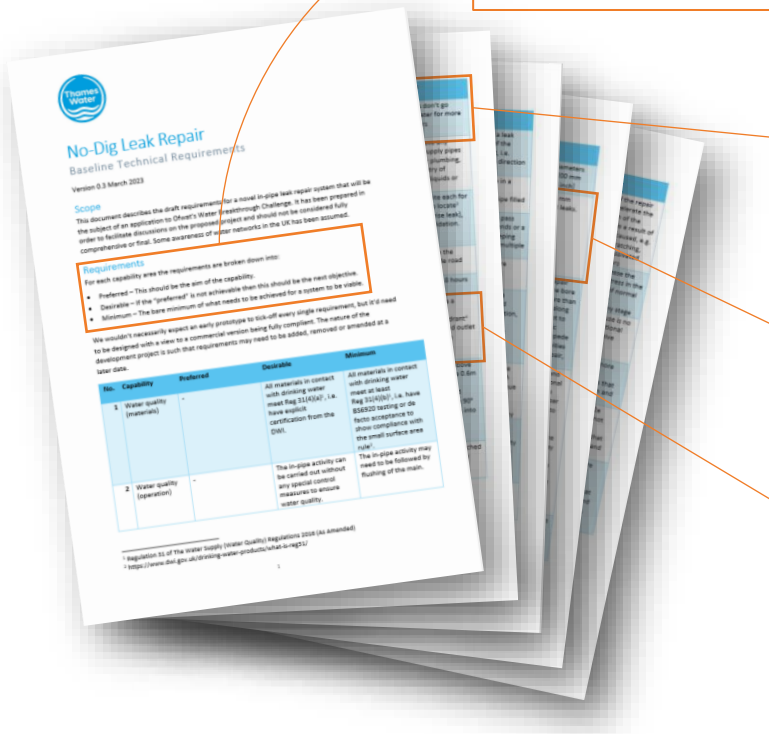
Our goal is to develop a prototype no-dig leak repair solution that's viable for commercialisation

The ambitious vision



No-Dig Leak Repair

Baseline Technical Requirements document



Requirements

For each capability area the requirements are broken down into:

- Preferred – This should be the aim of the capability.
- Desirable – If the "preferred" is not achievable then this should be the next objective.
- Minimum – The bare minimum of what needs to be achieved for a system to be viable.

No.	Capability	Preferred	Desirable	Minimum
3	Customer (water supply)	No interruption to supply or reduction in pressure at taps	No interruption to supply, but possible temporary reduction in pressure at taps	Customers don't go without water for more than 2 hours
20	Leak suitability (nature of failure)	Holes traditionally repairable by an external repair clamp, i.e. up to 33% of pipe diameter or 65 mm [2.5 inch], whichever is smaller; joint leaks; ring fractures; longitudinal fractures.	Holes traditionally repairable by an external repair clamp, i.e. up to 33% of pipe diameter or 65 mm [2.5 inch], whichever is smaller; joint leaks; ring fractures.	Holes up to 15 mm [0.6 inch]; joint leaks.
8	Insertion (asset)	Able to enter through a conventional screw-down BS750 Type 2 underground hydrant or other opening that's smaller than the target pipe	Able to enter via a through-bore underground hydrant with the threaded outlet in place (50 mm [2 inch] bore)	Able to enter via a through-bore underground hydrant[4] with the threaded outlet removed (80 mm [3 inch] bore)

- The project seeks to achieve at least the minimum level against each of the 29 requirements, and in many cases higher than this
- Stretch targets have also been set, but there may need to be trade-offs as the development progresses

No-Dig Leak Repair

Water main failures and current repair methods – in scope and out of scope



Failed joint seal

Minimum

Failed repair



Ring fracture

Desirable

Longitudinal fracture



Corrosion hole

15mm
65mm or 0.33D

Blow-out

Failed ferrule*



Repair clamp



Encapsulation collar



Pipe cut-out



Ferrule exchange*

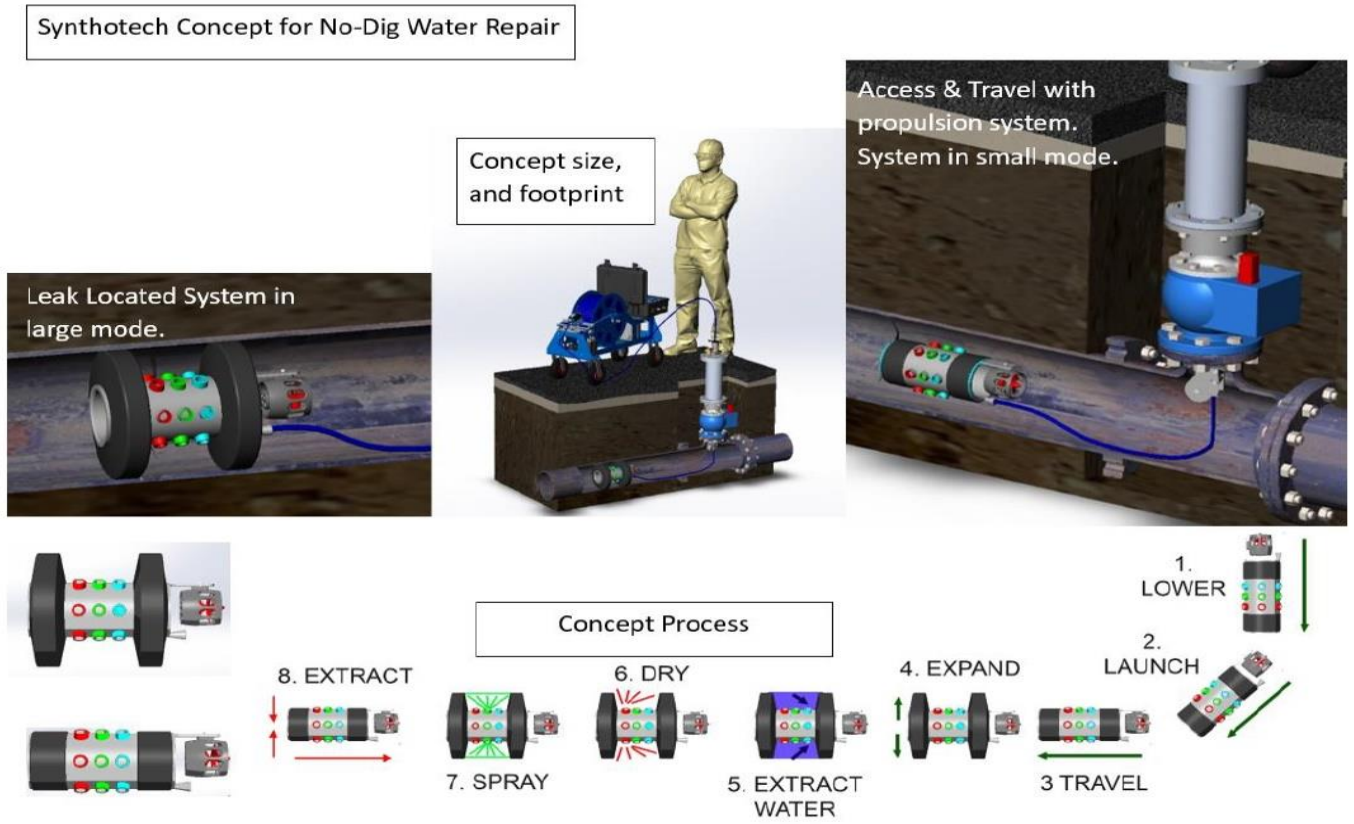
Others:

- Welding
- Tape wrap
- Joint repair clamp

*ferrules aren't strictly considered to be part of the water main

No-Dig Leak Repair

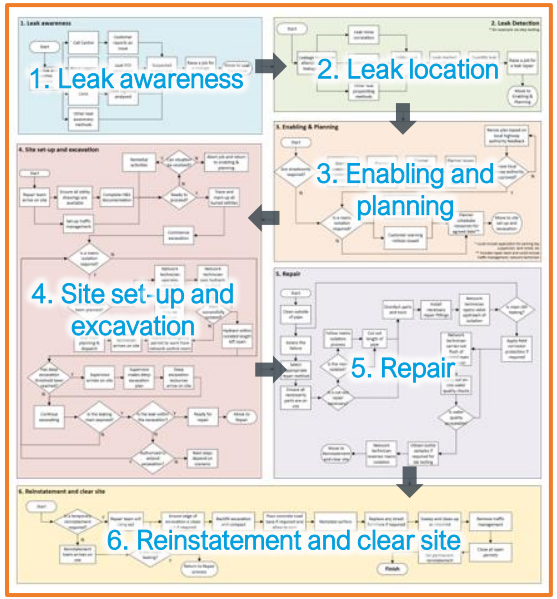
How an in-pipe repair technology might work



- Early concept illustration from the pre-application project development work
- Not all sub-systems and functionalities are depicted
- The sub-system concepts are purely indicative

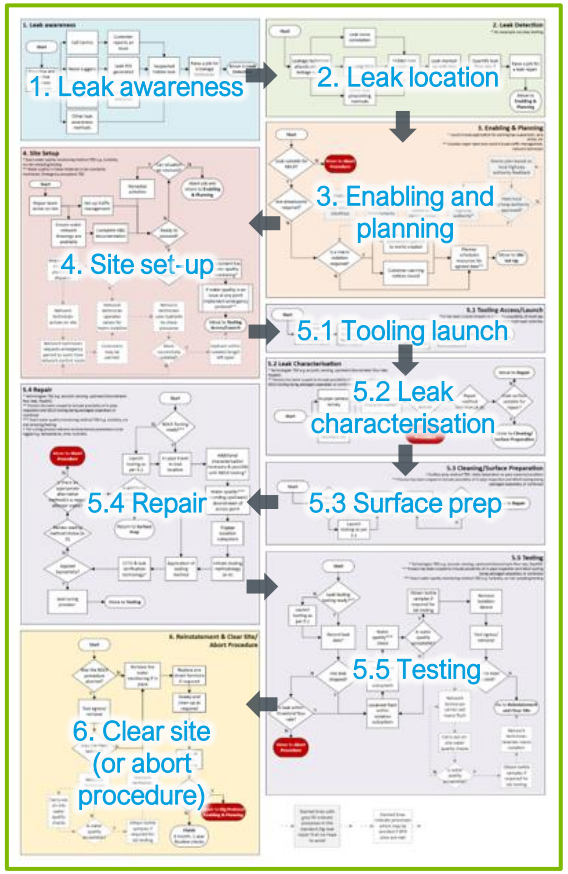
No-Dig Leak Repair

WP2: Operational Data Capture



▲ Existing **dig repair** process

Proposed **no-dig repair** process ►



- **Leak awareness** and **leak location** unchanged
- **Enabling and planning** intended to be simpler and quicker
- Easier **site set-up**, and no excavation required
- No-dig **repair** is broken-down into activities, with several break points built-in to abort and re-plan as a dig repair if necessary
- No **reinstatement** is needed at the end, just **clear site**

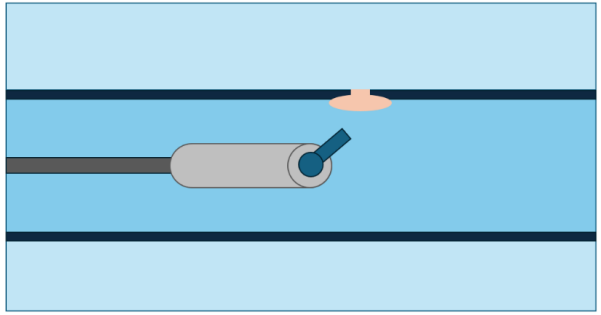
- WP2 also involved lots of knowledge transfer about water company assets, procedures and constraints

No-Dig Leak Repair

WP3 Conceptual Process Design

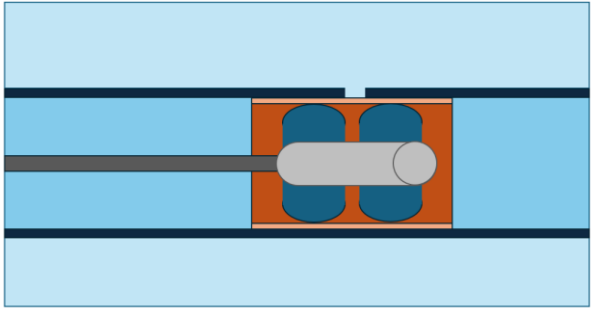
Concept A – Point application

Think: sealant gun



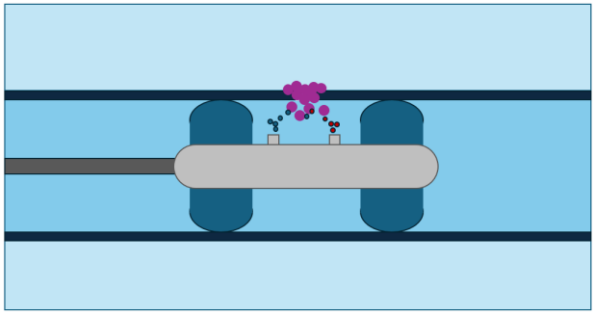
Concept B – Clamp / Liner

Think: pipe in a pipe



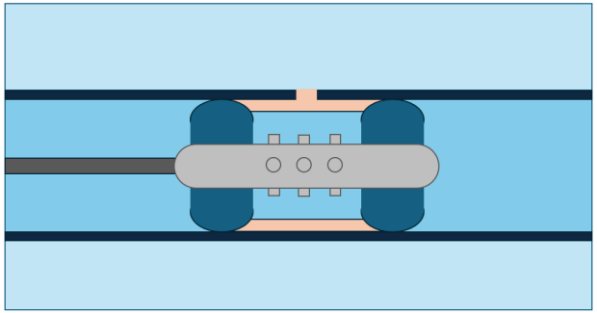
Concept C – Flow based

Think: blood platelets



Concept D – Local injection

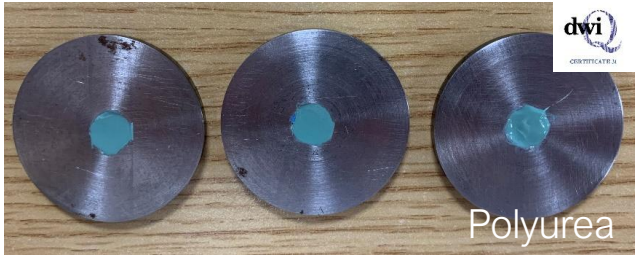
Think: injection moulding

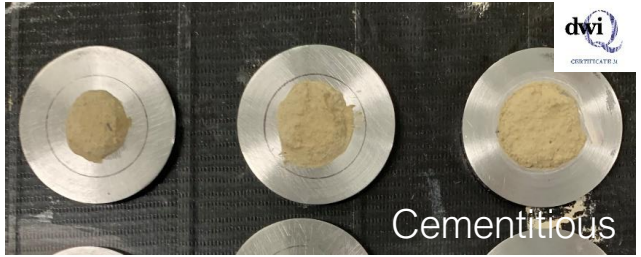


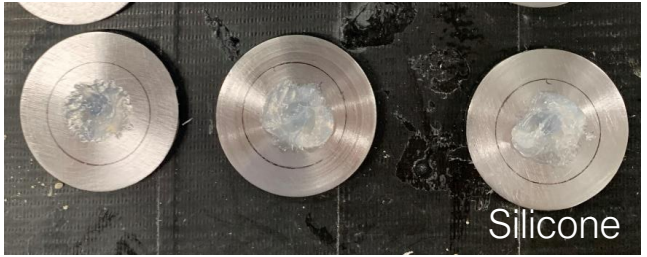
No-Dig Leak Repair

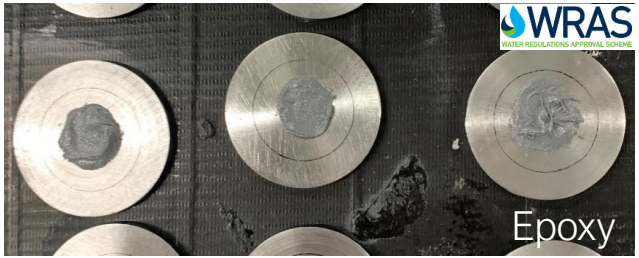
WP4 Research and concept designs

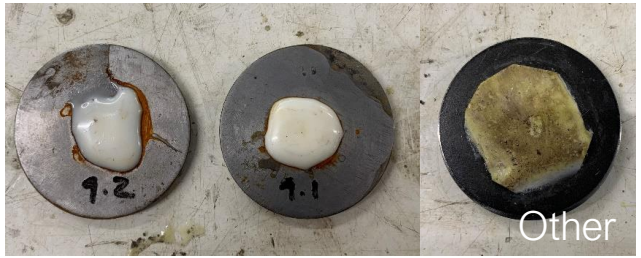
- Desktop evaluation of commercial sealants: Reg 31 approved, WRAS approved, and others
- Benchtop testing of selected representative sealants (hand applied then pressure tested)













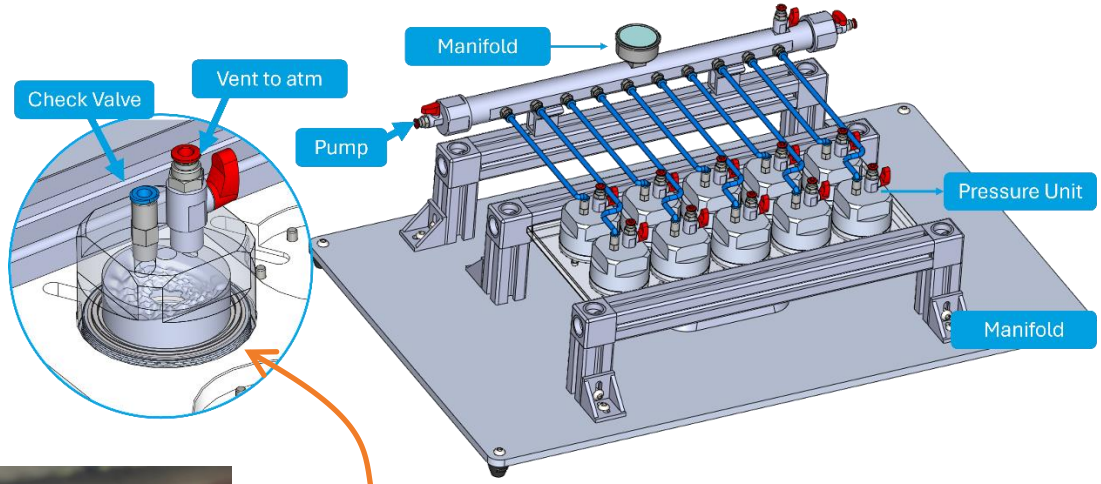
Successful pressure test

Promising result but needs further investigation

Failed pressure test

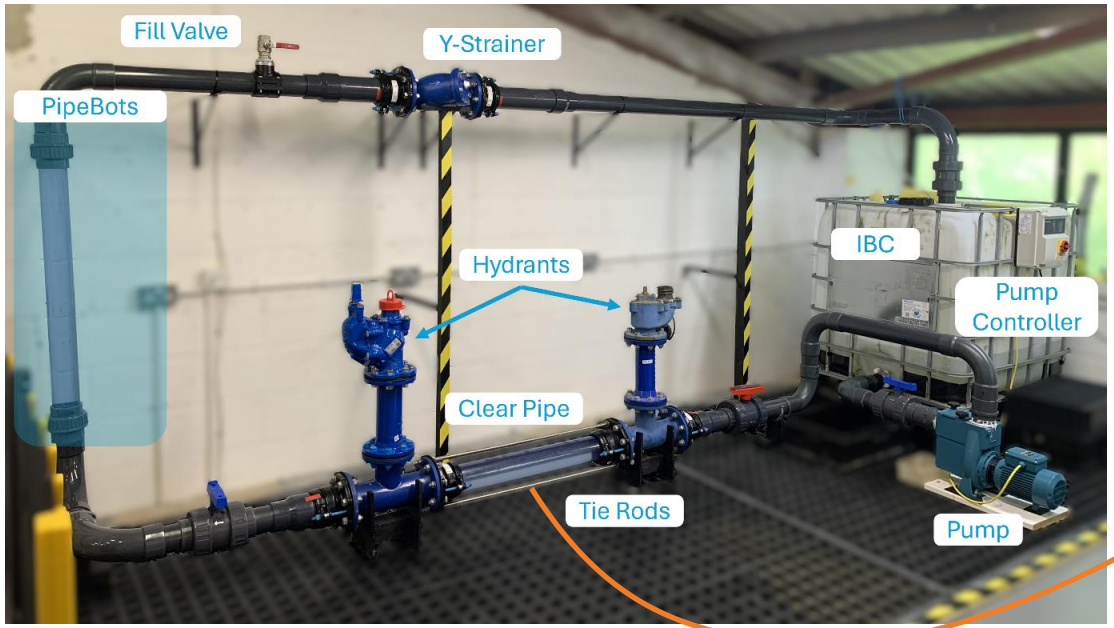
No-Dig Leak Repair

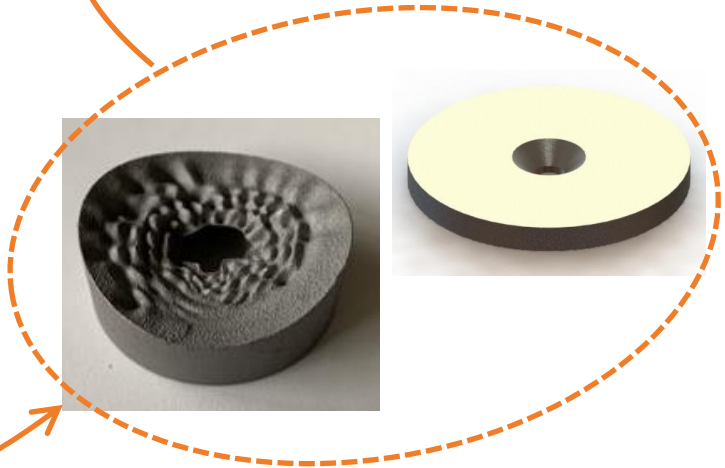
WP5 Test site / rigs



Performance test rig ▶

▼ Functional test rig





▲ Test coupons

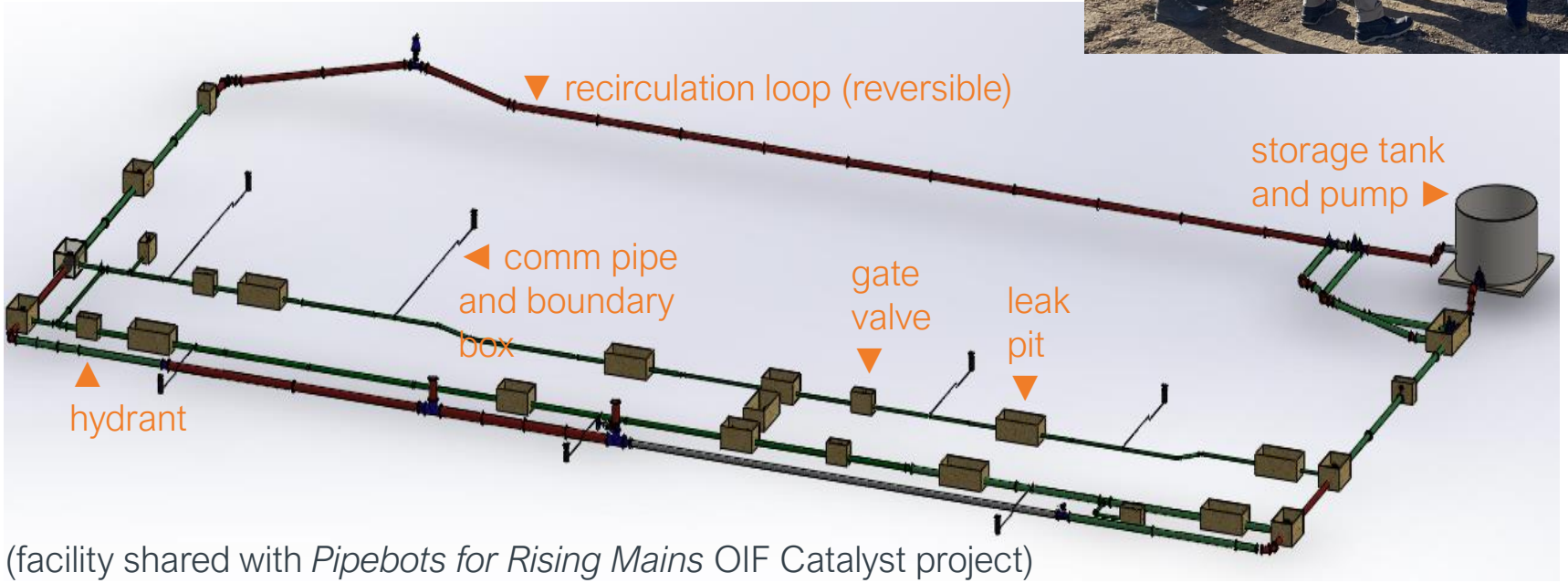
No-Dig Leak Repair

WP5 Test site / rigs

Test site tour at Innovation in Action event, Synthotech Test and Research Site (STaRS) ►



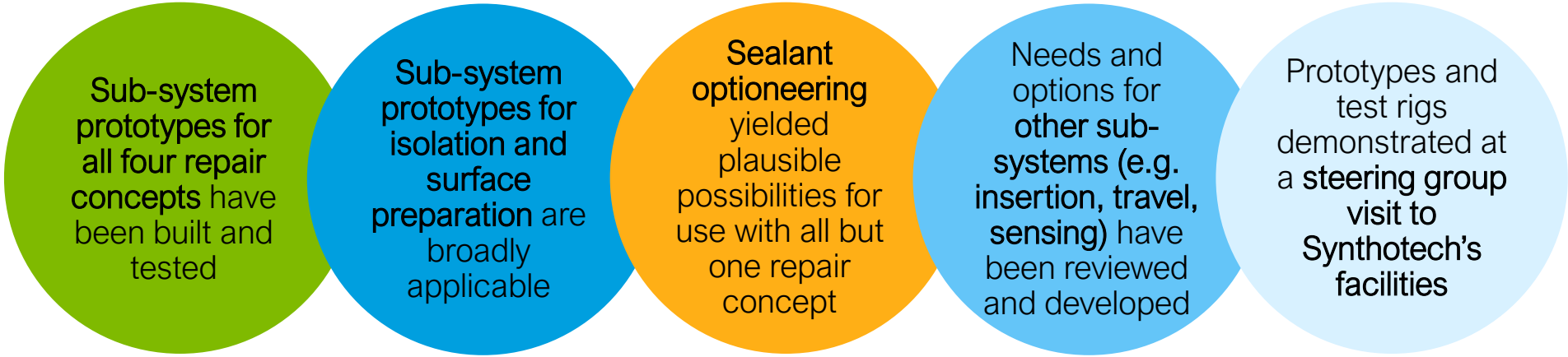
▼ Test site CAD drawing



(facility shared with *Pipebots for Rising Mains* OIF Catalyst project)

No-Dig Leak Repair

Phase 1 highlights



No-Dig Leak Repair

Next steps

- End of Phase 1 (TRL4) Go/No-Go assessment:

	End of Phase 1 "Go" Criterion	Evidence to be presented
1	Technical feasibility	Re-evaluation of expected achievement levels against Baseline Technical Requirements, with commentary about progress and any significant changes
2	Deliverables	All phase 1 deliverables signed-off
3	Risk Register and Mitigation	Risks documented and mitigated adequately
4	Health & Safety	One page report demonstrating compliance with H&S measures
5	Alignment and staying on track	Positive momentum and tangible progress



No-Dig Leak Repair

Summary

- We’re aiming to kickstart the development of technologies for no-dig repair of water main leaks that will meet the requirements of UK water companies
- The Ofwat Innovation Fund project is led by Thames Water, with Synthotech as the principal development partner
- Work commenced in October 2024 and runs until January 2029
- Progress to date has focused on transferring water company knowledge to the delivery team, refining the business case, building test rigs, and developing and testing in-pipe repair concept solutions





Thank you



Q & A

Awareness and locate (PALM)

Infrastructure monitoring infrastructure: Can dark fibres find leaks? Ofwat Innovation Fund: Dark Fibre 2 update



Ed Austin
Founder and Managing Director
Focus Sensors



Darius Bristow
Senior Project Manager
Severn Trent Water

Infrastructure Monitoring Infrastructure

Can dark fibres find leaks?

November 2025

www.focus-sensors.com

The prize – why we want to do this

- To reduce leakage, we'll need to add more monitoring
- 350k km of pipe – would need in excess of a million acoustic loggers
- Adds to the tool detection arsenal
- Within the leakage PALM framework dark fibre addresses:
  - Aware – not waiting 24hrs to listen in
  - Locate – accurate to +/- 1m



Our vision is to monitor infrastructure 24/7 using optical fibres that are already installed

Why are we able to do this?

Technology

- Turns standard optical fibre into thousands of sensors
- Unique performance
- Granted Patent : WO2018134137A1

Package

- Smaller size
- Lower cost
- Lower power consumption
- Commercially available

Platform

- Multi use-case, multi customer business model
- Scalable cloud-based
- Ground stability patent pending

Optical fibre cables can now monitor infrastructure reliably



History

Concept → Initial test → Dark Fibre 1 → PoC (Ofwat) → Dark Fibre 2 → Pilot (Ofwat)

Outcomes

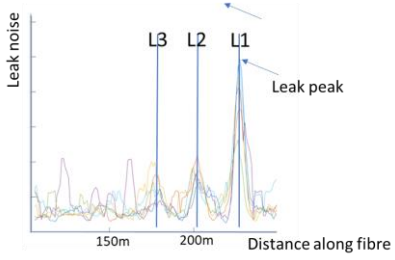
Feasible to monitor leaks using nearby dark fibres

Direct – noise from leak

Indirect – effect of water

Outcomes

Controlled environment test



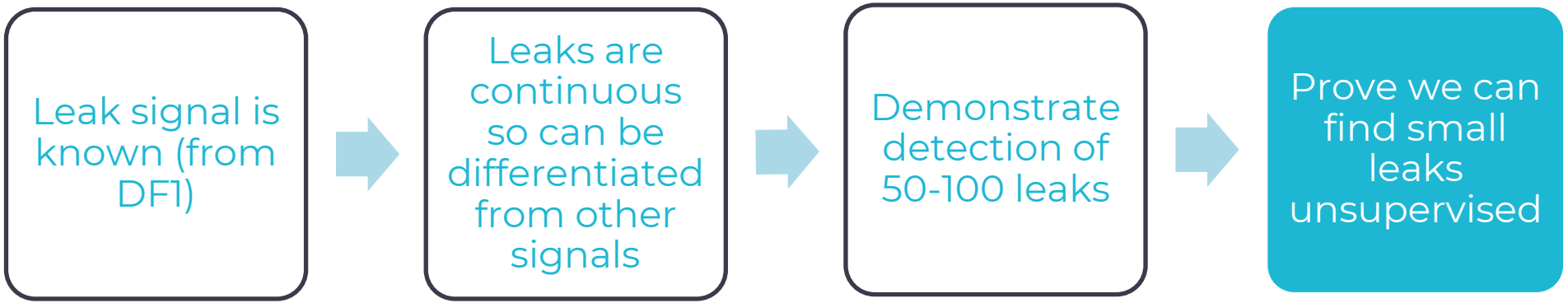
4km live trial

Dark Fibre 2 outcomes

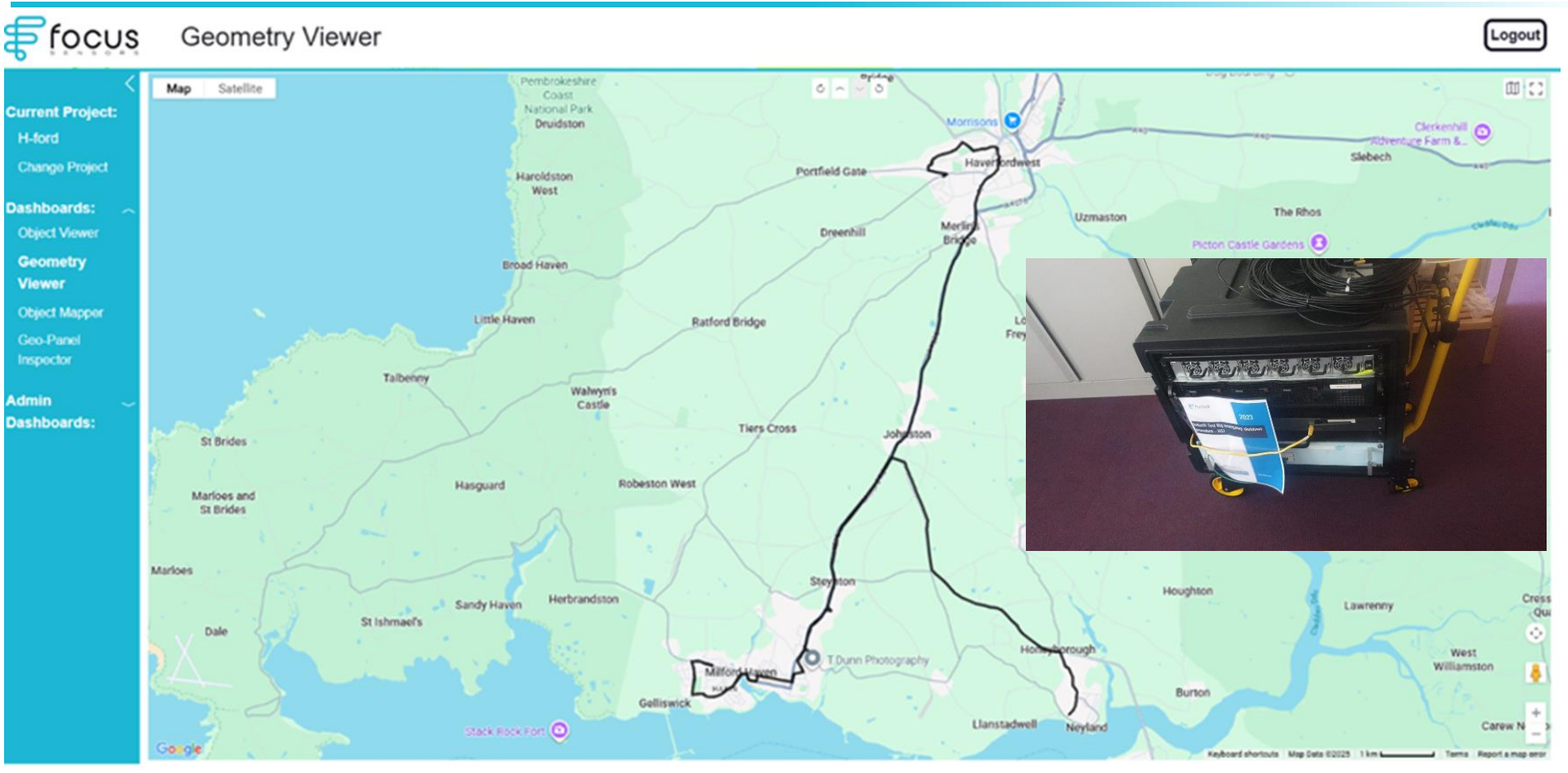
- 5 areas monitored across 3 water companies
- 120km water pipe monitored
- 7 simulation sets, each containing multiple tests and 3 real leaks located with +/- 1m accuracy
- Smallest leak 3lpm (simulated) 5.4lpm (real)

Dark Fibre 2 – the search for small leaks

- Project plan



The Installs



The calibration tool - Dolfin

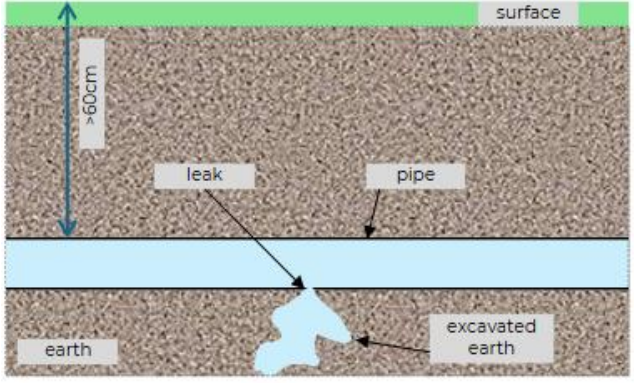
- To simulate leak signals
- Calibration of system
- Allows us to confirm coverage of the system
- Battery powered, portable

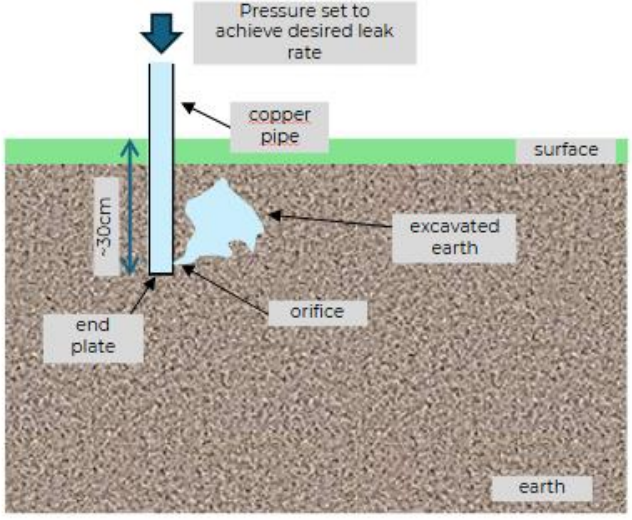


Leak simulation tool

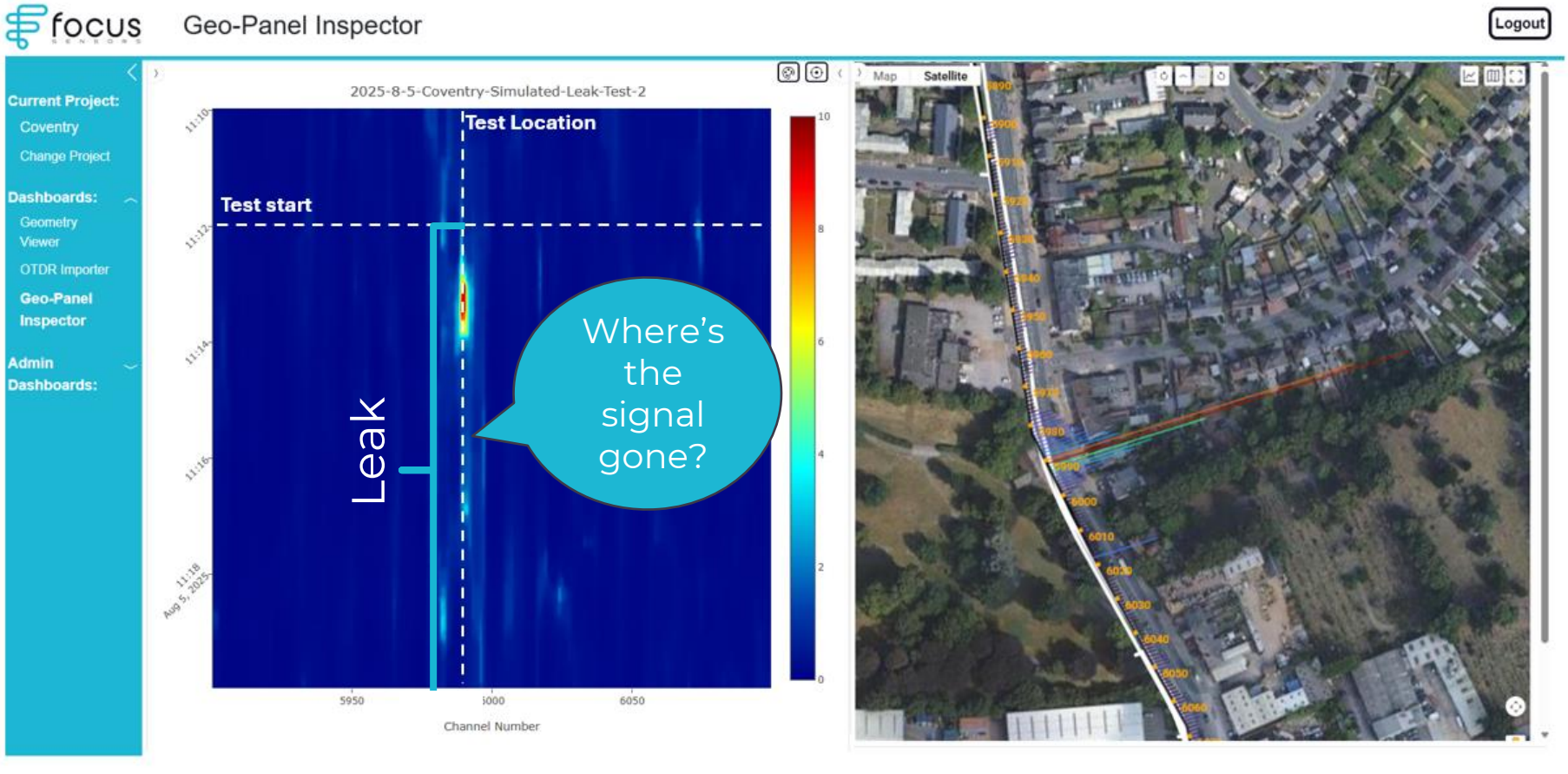
- Traditionally simulating a leak is opening a hydrant
- This is not representative for dark fibre leak detection
- Alternative technique means we can simulate a leak anywhere



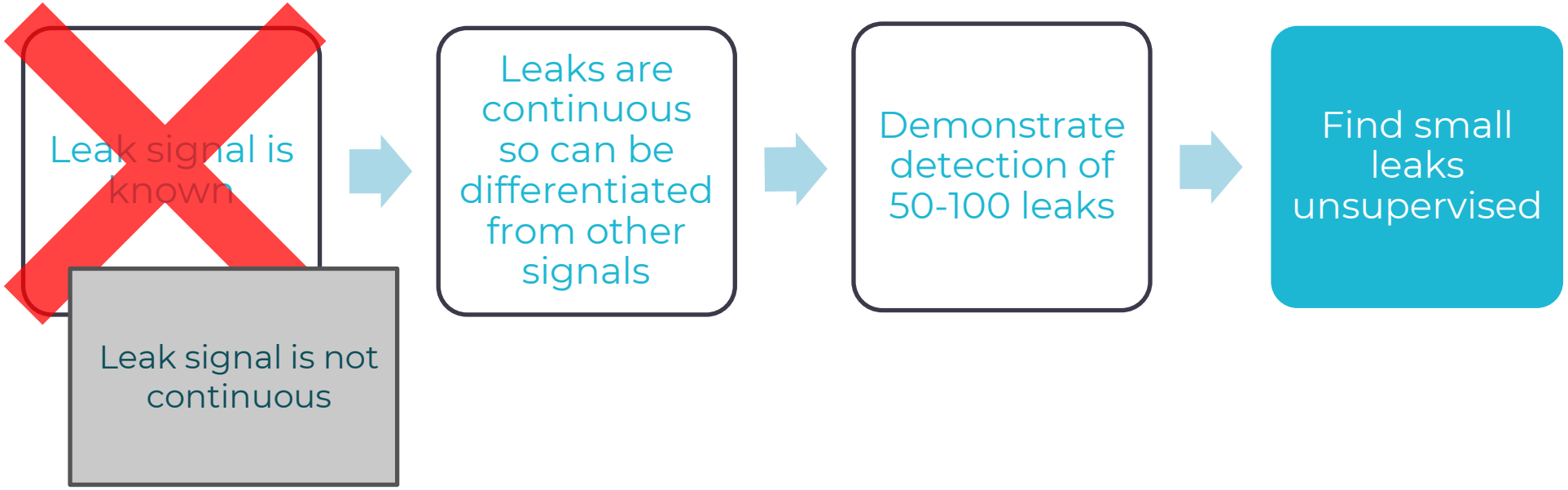




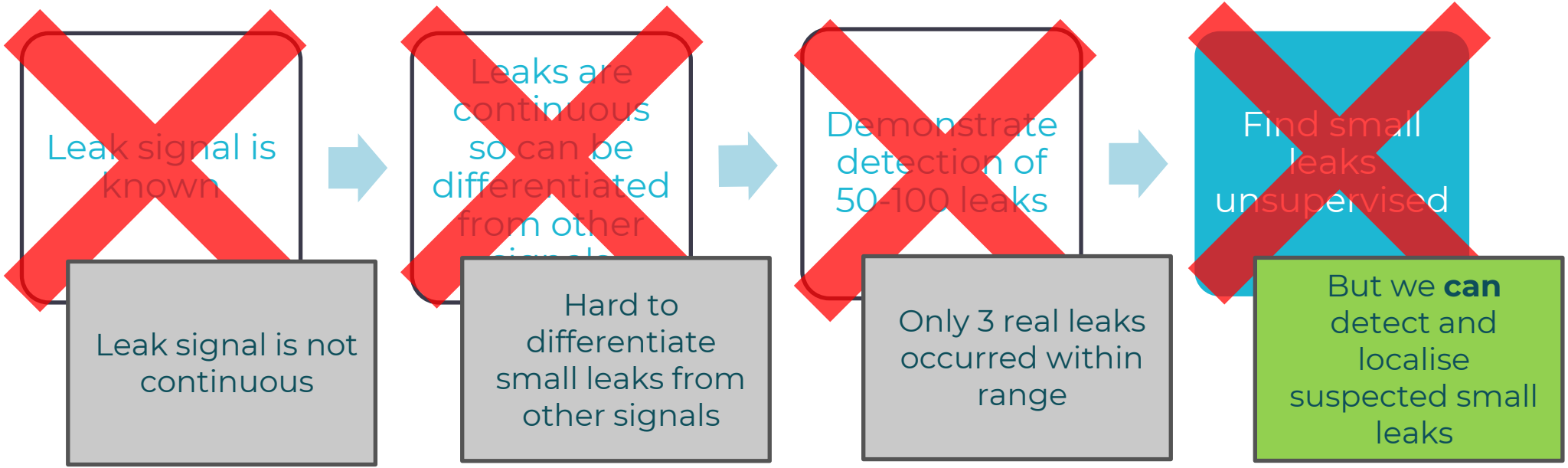
Simulated leak detection



Dark Fibre 2 – the search for small leaks

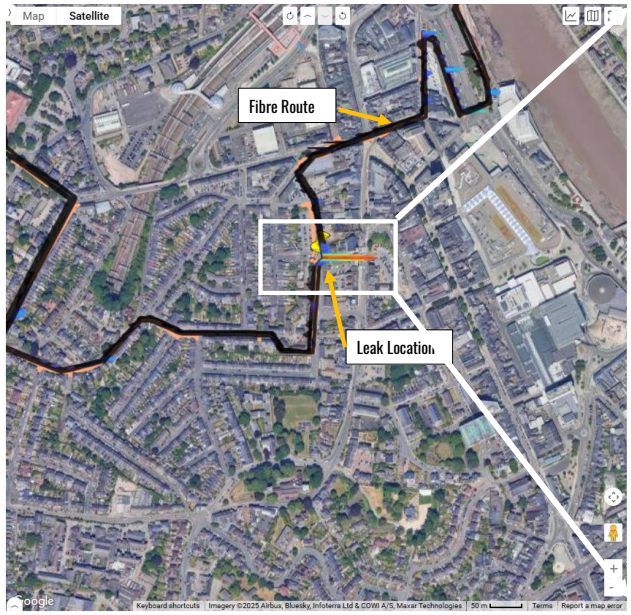


Dark Fibre 2 – the search for small leaks



Example real leak localised

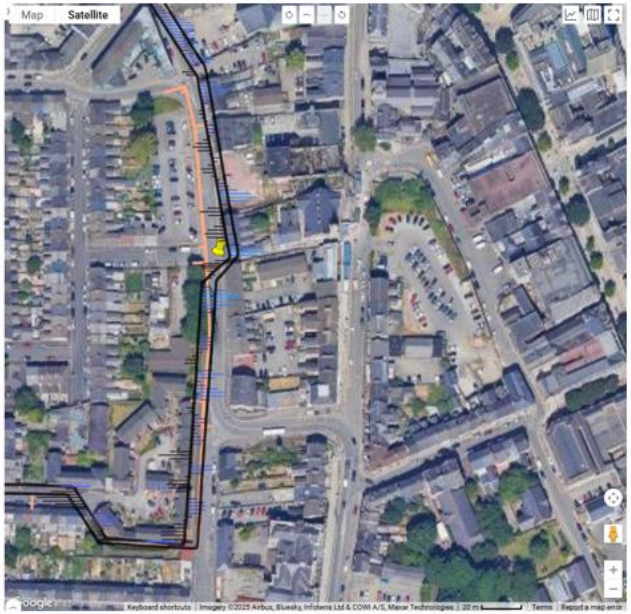
#	Site	Dates	Location	Job details	Estimated distance to fibre	Leak detected & localised	Comments
	Newport	2024/11/12 (Completed Date)	15 North Street, NP20 1JZ	Repair Leaking Communication Pipe	1m	Yes	Signals detected.



Leak scan within 1km zone



Leak localised



After leak repair

“We need products which with confidence will pin-point where our leaks are. Our technicians want to minimise the time they spend trudging round DMAs looking for a leak. We want to spend our customers’ money in the most efficient way. We are excited at the very real possibility that dark fibre will be able to pinpoint both new and existing leaks. Meaning leaks can be detected earlier, located more accurately and our technicians’ time and customers’ money more efficiently utilised.”

Mikal Willmott, Severn Trent

Conclusions

- Leaks can be detected and located using nearby telecommunications fibres
- Small leak signals are not continuous, so difficult to separate from other non-continuous signals like traffic
- Small leaks addressed through targeting known leak areas
- Strong collaboration with water companies continuing to develop

www.focus-sensors.com



Q & A

Opportunities from fibre sensing



Raj Jayawardena

EVP – Business Development and Transformation

FibreSense

Opportunities from fibre sensing

Annual Leakage Conference 2025

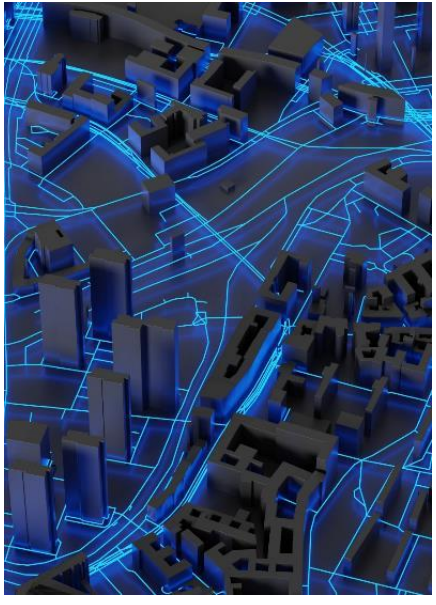
Date: 25 November 2025

FIBERSENSE

The FiberSense Model & Mission



Deploy Distributed Fibre Sensing networks



Deliver sensing as a Service

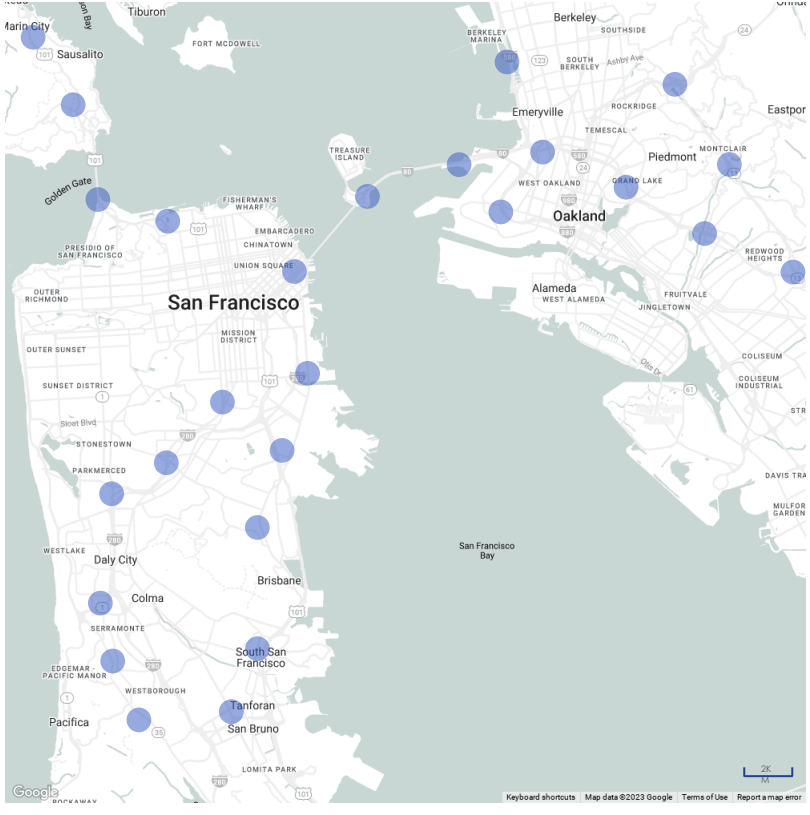


Exploit the intersection of fiber sensing, machine learning and AI



Deliver animated digital twins of infrastructure and cities

Point Sensors vs Fibre Sensing Solution



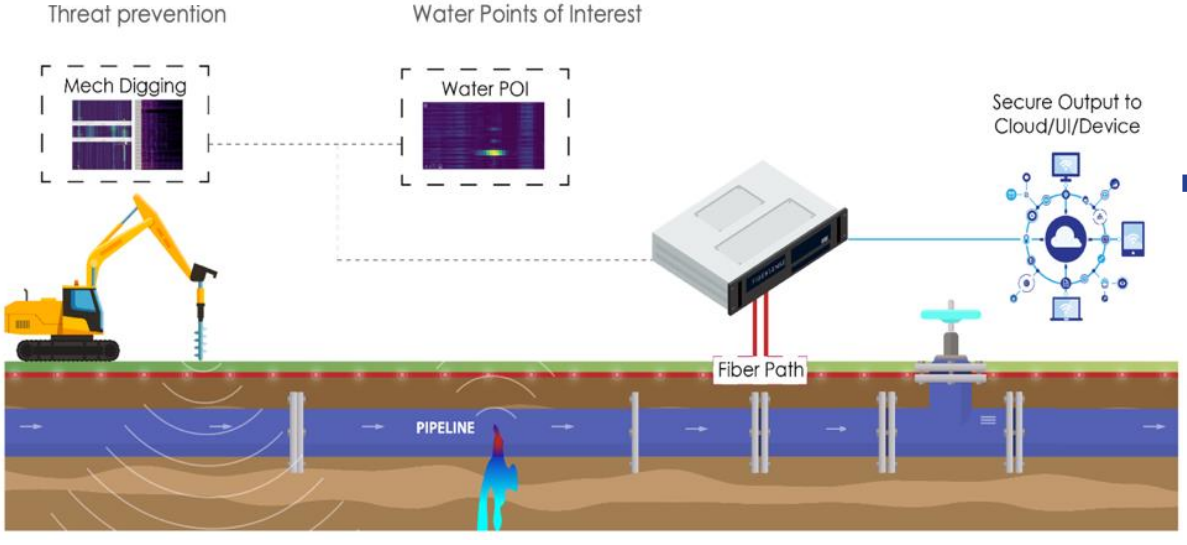
Point Sensors = Limited Coverage of critical paths.



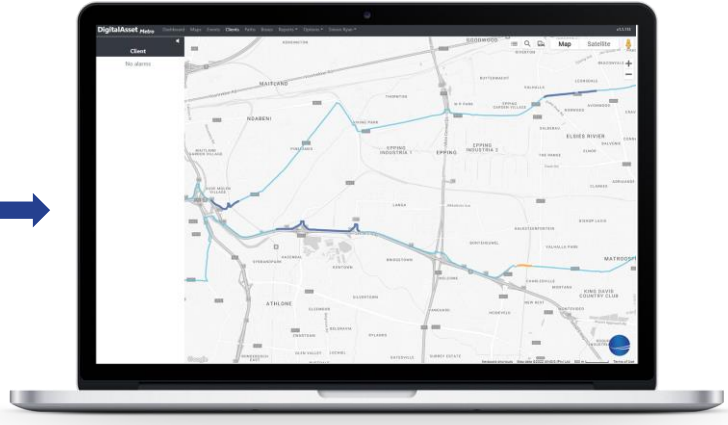
Fibre Sensing = Full Coverage of critical paths.

Distributed Fibre Sensing

Fibre sensing creates a passive continuous sensing array for real-time detection, discrimination and response.



Distributed Sensing Network using existing fibre in the street



User Interface displays actionable insights

Opportunities for the water industry through fibre sensing

Reactive

- **Burst detection** – real-time detection of bursts/blow-outs on trunk and distribution mains
- **Leakage reduction** – detection of leaks achieving a reduction in non-revenue water losses

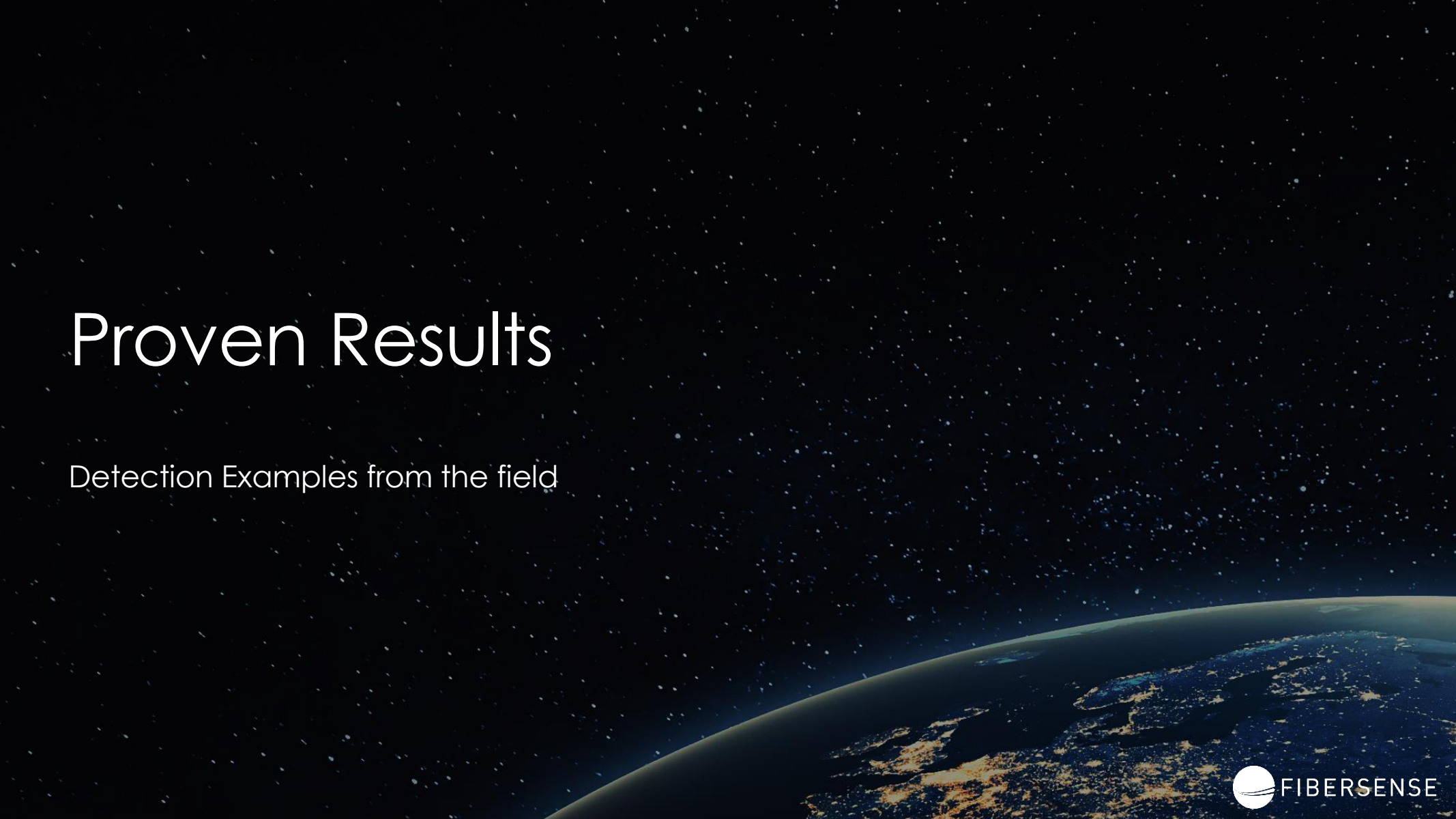
Proactive

- **Asset protection** – wide scale 24x7 monitoring and protection against network
- **Leak before break monitoring** – continuous monitoring allows for early identification of leaks that have the high chance of transitioning into a substantial leak
- **Network calming** – continuous monitoring allows for the identification of normal and abnormal operation delivering the ability for proactive intervention

Commercial In Confidence
FiberSense 2023

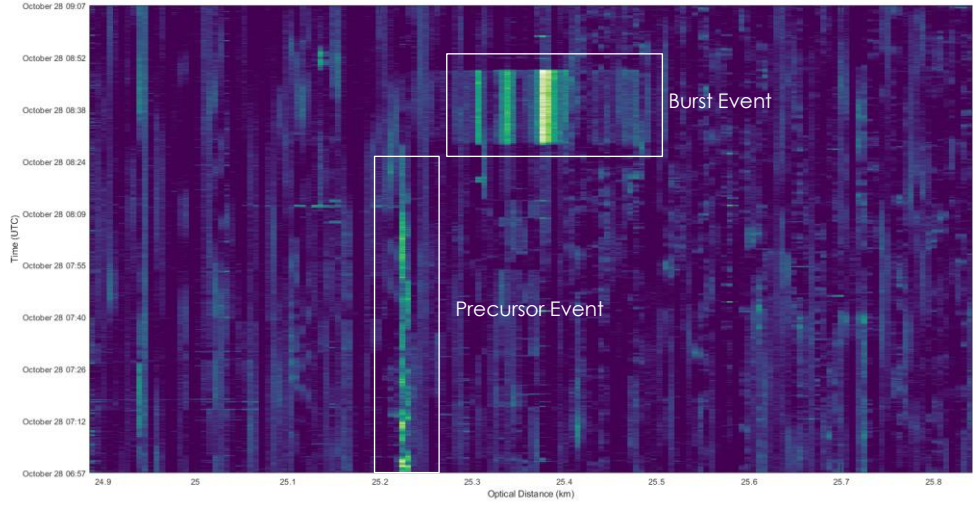
Proven Results

Detection Examples from the field



Leak before Burst

By identifying "leak before break" precursor events, we can detect and address leaks early, thereby conserving resources, saving money, avoiding costly property damage and potentially preventing life-threatening situations and public health concerns.



Stormwater Flows

- Light rain was experienced on 16/11/2022.
- The drainage activity was recorded by by the fibre sensing system at several locations throughout the city.
- The information recorded by the fibre sensing system can distinguish when drainage pipes begin to flow, and for how long.
- Water flow detection can be used to valid the presence of leaks and bursts.

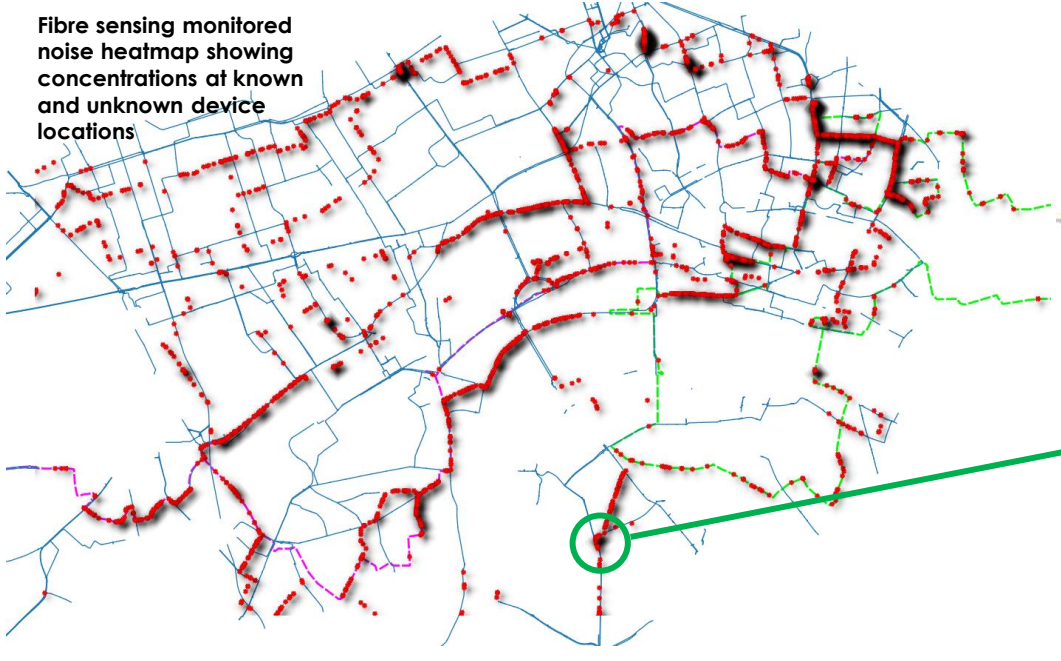


Commercial In Confidence
FiberSense 2023

Network Calming

- Hydraulic devices in networks regulate flow and pressure and as they do so noise is created which is detected by the fibre sensing system.
- This noise is used to monitor normal and abnormal patterns in both utility and connected customers devices and supports proactive network calming.

Fibre sensing monitored noise heatmap showing concentrations at known and unknown device locations





Trunk Main PRV (Control Valve) noise patterns – monitored and stored for normal and abnormal operation detections

Conclusions about Fibre Sensing Opportunities for Water

First sensing capability that provides net economic benefit at scale via sensing over existing telecom networks offering a very high capability to cost ratio

- Ubiquity and passive nature means wide coverage and lower installation/operating costs than traditional techniques
- Interference immunity means that sensing can be effective in noisy environments
- Effective on all manner of pipe materials as detection not dependant on transmission along the pipe
- Continuous monitoring allows for detection of normal and abnormal operation of plant and infrastructure over time positively contributing to network calming
- Versatility of detections satisfies multiple use cases (e.g. burst/leak detection, condition monitoring, damage prevention)

Commercial In Confidence
FiberSense 2023

FIBERSENSE

Game changing real time detection of objects and events

This document and its contents are confidential and accordingly it should not be copied, distributed, published or reproduced, in whole or in part, or disclosed by the recipient to any other person without the prior consent of Fiber Sense. If requested by Fiber Sense, the recipient shall return this document and any copies of it. By accepting this document, the recipient agrees that it will cause its directors, officers, employees, contractors, agents and representatives to maintain the confidentiality of this document and its contents.



Q & A

Mend (PALM)

Origin NoDig – A trenchless repair technology. Development, deployment, learnings and the future



John Marsden

Founding Director

Origin Tech

ORIGIN

ORIGIN NO DIG®

A TRENCHLESS REPAIR TECHNOLOGY.
DEVELOPMENT, DEPLOYMENT, LEARNINGS, AND THE FUTURE.



ORIGIN

ORIGIN NO DIG®

What is it

- 3 component parts
  - Water
  - Food grade gellant
  - Engineered particles of calcium carbonate
- BS6920 tested
- DWI confirmed Reg 31 4b product
- Patented technology

Main Advantages

- Don't need to pin point the leak
- Don't need to dig up the leak
- Over 100 times quicker than traditional repairs
- At least 50% cheaper than traditional repairs
- 1 person can repair 1000 comm or supply pipes per year



ORIGIN

DEVELOPMENT

- Founded Dec 2019
- R&D Lab Scale 2020-2021
- BS6920 Testing Feb 2021
- Applied DWI approval Sept 2021
- Off network mains testing
- 1st Mains Repair July 2022 NWL
- 1st New clients Jan/Feb 2023
  - Affinity and Thames
- Now only 4 left





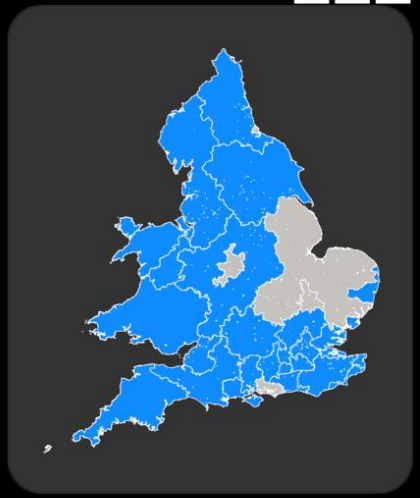


ORIGIN

2025 NUMBERS

NO DIG ORIGIN

Area	Successful Repairs
Severn Trent Water	3938
South East Water	120
South West Water	1336
Southern Water	290
Thames Water	825
United Utilities	143
Wessex Water	130
Yorkshire Water	564
Total	**9494**

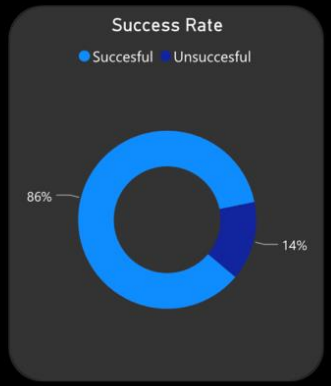


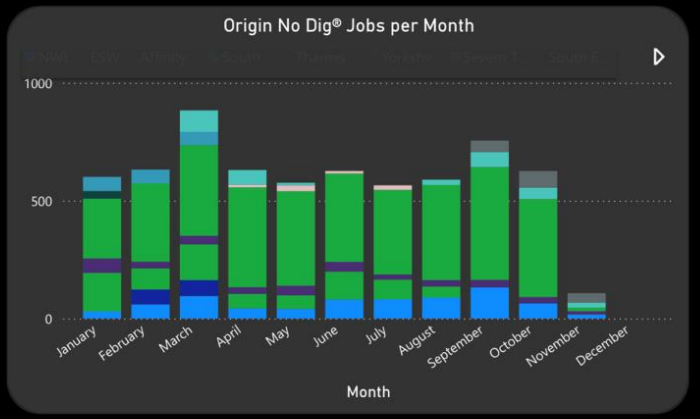
Total Number of Origin No Dig® Jobs

11K

Origin No Dig® Oct Jobs

312





ORIGIN

HOW IS IT USED – 1ST TIME





ORIGIN

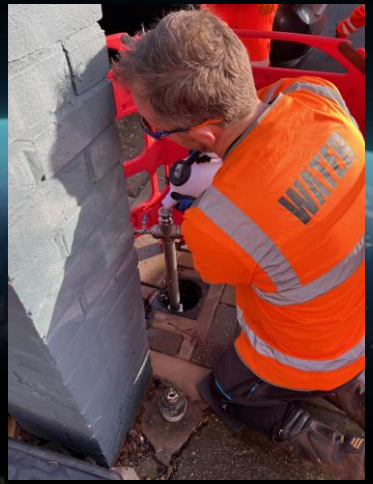
HOW IS IT USED – COM PIPES











ORIGIN

HOW IS IT USED -MAINS

- Fill a section of the main





ORIGIN

HOW IS IT USED -MAINS

- Mains Insertion tool
- Modified Synthotech camera system







ORIGIN

HOW IS IT USED –FIND AND FIX

ORBIT ORIGIN

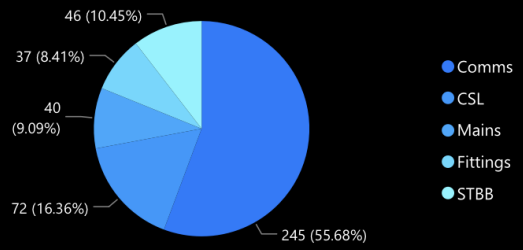
NORTHUMBRIAN WATER living water

Set alert

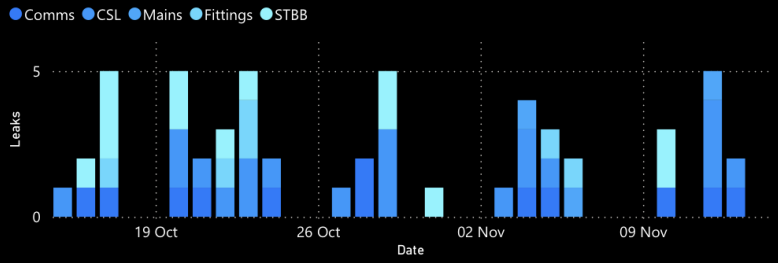
Date 01/10/2023 26/05/2026

Leaks Identified	Suitable for Origin No Dig®	Origin No Dig® Fix	Mains	Comm Pipe	CSL	Mains Fitting	ST/BB	Volume Identified (ML/d)
440	121	97	40	245	72	37	46	14.46

Pipe Type



Leak Type By Date





Leak Type Comms CSPL Fitting Main STBB

ORIGIN

LEARNINGS - OPERATIONAL

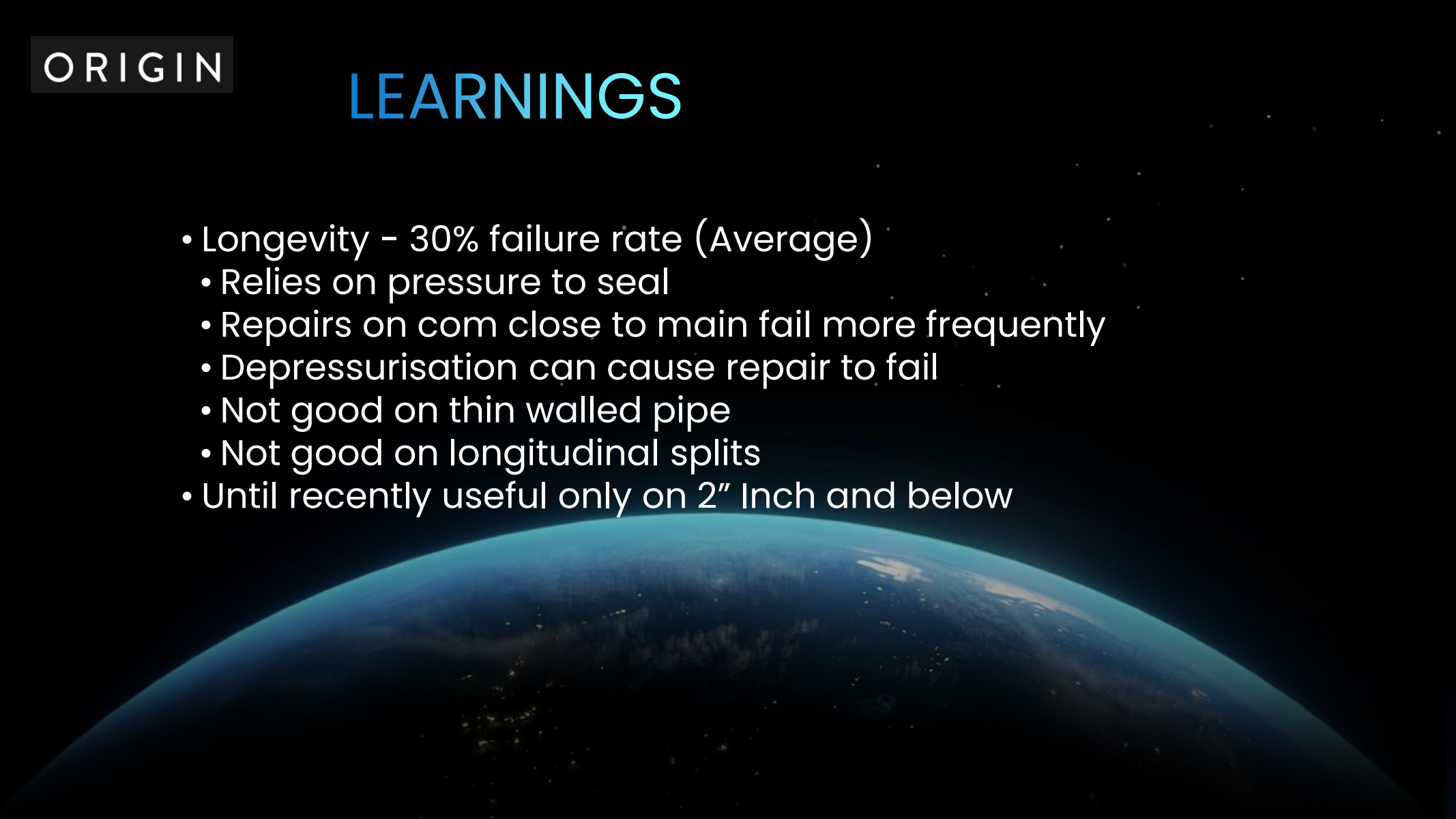
- Some companies can change quickly
- Job promotion and planning
- Triaging of jobs
- Who deploys the Origin No Dig®
  - Us
  - Leak Techs
  - DLOs
  - R&M Crews?
- Incumbent R&M Contractors can be difficult
  - Like turkeys voting for Christmas



ORIGIN

LEARNINGS

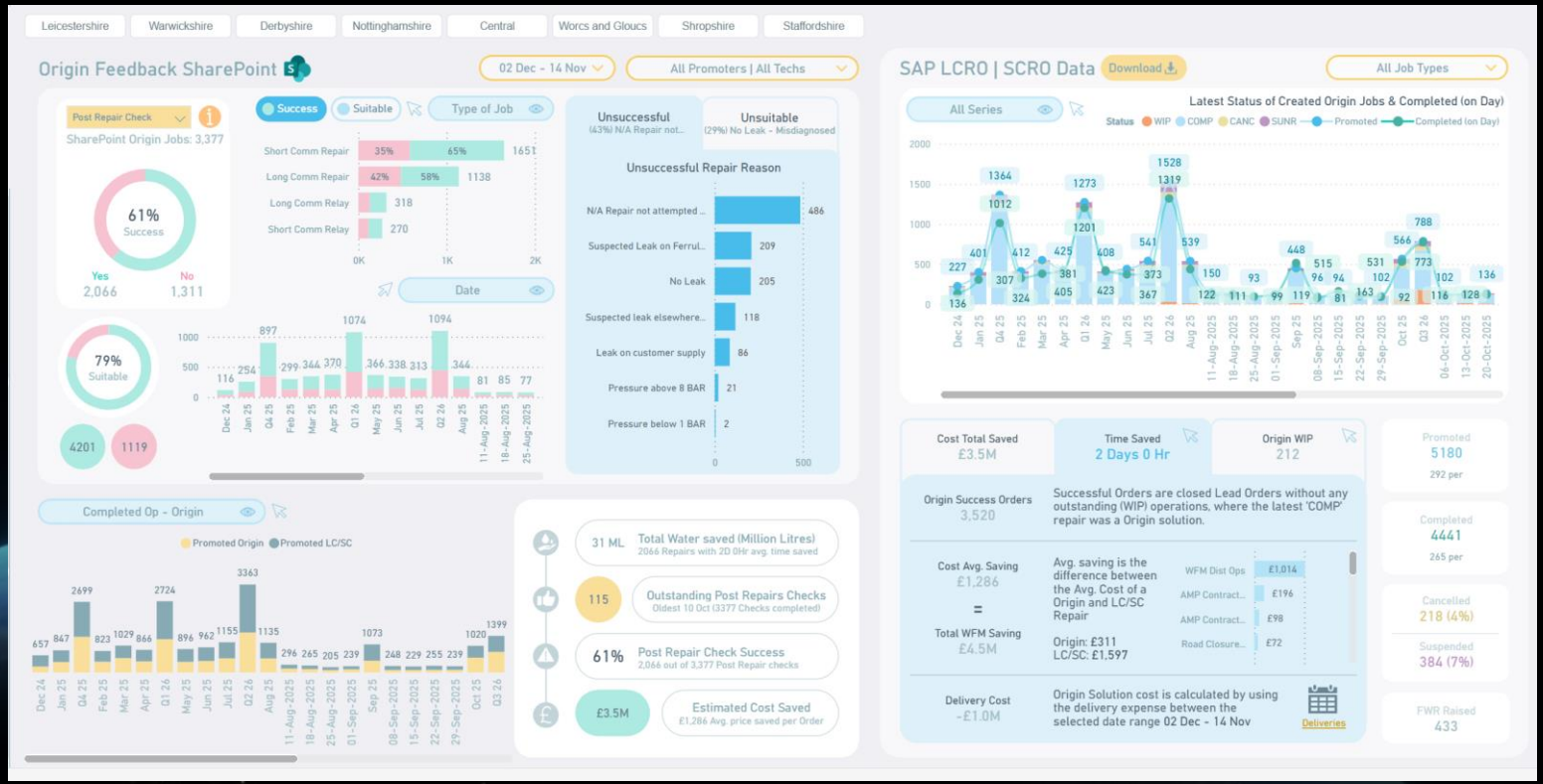
- Longevity - 30% failure rate (Average)
  - Relies on pressure to seal
  - Repairs on com close to main fail more frequently
  - Depressurisation can cause repair to fail
  - Not good on thin walled pipe
  - Not good on longitudinal splits
- Until recently useful only on 2” Inch and below



ORIGIN

LEARNINGS - IMPLEMENTATION

- Severn Trent
  - DLOs deploy No Dig
  - Typically 400 repairs a month
  - Over 120 personnel trained
  - £3.5M saved
  - 31ML saved

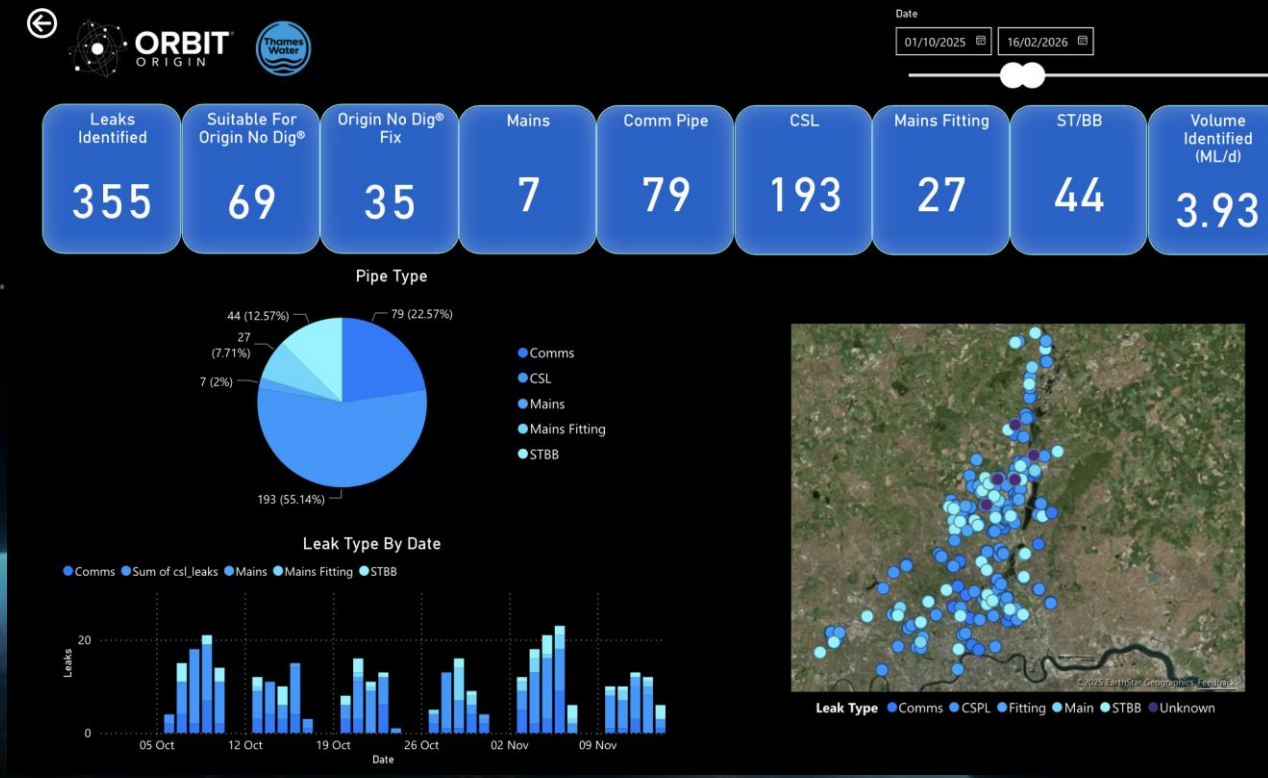


ORIGIN

WHERE COULD THIS GO

- Scale Find and Fix Nationally
- Increase fixes to 40% of all repairs with mains and CSL
- Reduce failure rate to below 20% with setting Origin No Dig®
- Significantly impact leakage nationally

(Example 3 teams for TW trial)



ORIGIN

QUESTIONS





Q & A

Special Leak Services



Jason Harvey
Head of Innovation –
Drinking Water Operations
South West Water



Jeremy Heath
Innovation Manager
SES Water

The Leakage Conference 2025

Special Leak Services

Jason Harvey – Head of Innovation, Pennon Clean Water

Jez Heath – Innovation Manager, Pennon Clean water

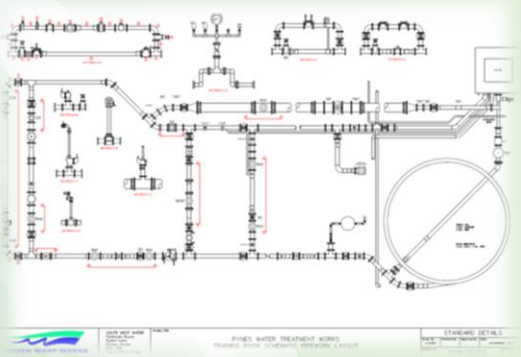
An Emphasis on ‘Mend’

- Building on a suggestion made in previous years, we are proposing **Special Leak Services**, which will be set up and run from Pennon, managed by Jason Harvey.
- Similar to the Croydon Group (which looks at customer side leakage) this would be a collaborative approach across the water companies and contractors to share new products, learnings and good practise.
- Concentrate on difficult to repair bursts (worst 10%), but ensure that new techniques are trickled down into standard repair methodologies within companies.
- Anticipate that the trunk mains work will highlight leaking trunk mains, which will be some of the most challenging repairs.
- The skills required are based around PRIME.

An Emphasis on ‘Mend’

- Require (at least) five disciplines.
- Planners – early identification of difficult jobs and innovative planning approaches
- Regulatory – Water quality and compliance but also liaison with councils .
- Interruption specialists – manage the isolation of the main and new techniques.
- Mend specialists – companies and contractual staff able to undertake difficult repairs.
- Explainers – experts at sharing knowledge and understanding with other companies
- We will start with combining Planners & Regulatory into a “Process” group and Interruption & Mend Specialists into a “Product” group.

An introduction to Pynes and Jason, Mend.



- More than three decades of frontline network operations
- Civil engineer, MSc pipeline engineering
- Recently moved to a Pennon Group clean water innovation lead
- Reimagined a commonly installed transient energy training facility
  - Fitted with all common network control and measurement devices
  - Enabled for product testing to 16bar, up to 5m/sec V, 80mm to 225mm plumbing
  - High resolution flow and pressure monitoring
- Training facility utilised to ensure competent, trained people = effective, efficient, competitively advantageous outcomes

Who repairs, wins



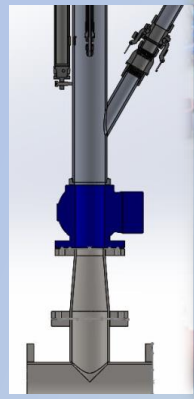


- Special Leak Services will be:
  - Highly selected human resources and equipment
  - Exceptionally trained technicians
  - Cutting-edge, pioneering equipment
  - Leading on tactics – novel & innovative
  - Resourceful under adversity – on the clock
  - Strong partnerships with suppliers
  - Success from sharing, success from fast, novel, repairing
  - Responsive – 24/7/365 – social network, WhatsApp
    - Universal access, no barriers
    - Multimedia sharing, inc live video



Innovative mend solutions.

- Novel flow stopping solutions being developed – accessed via through bore hydrants
- Fast fix (temporary, get the water back on a plan) solutions for longitudinal fractures
  - The Pipe Plaster
  - Resin wraps, putties and tapes





Avant guarde

Something that breaks precedent, regarded as innovative, pushing boundaries … dissident, heretic







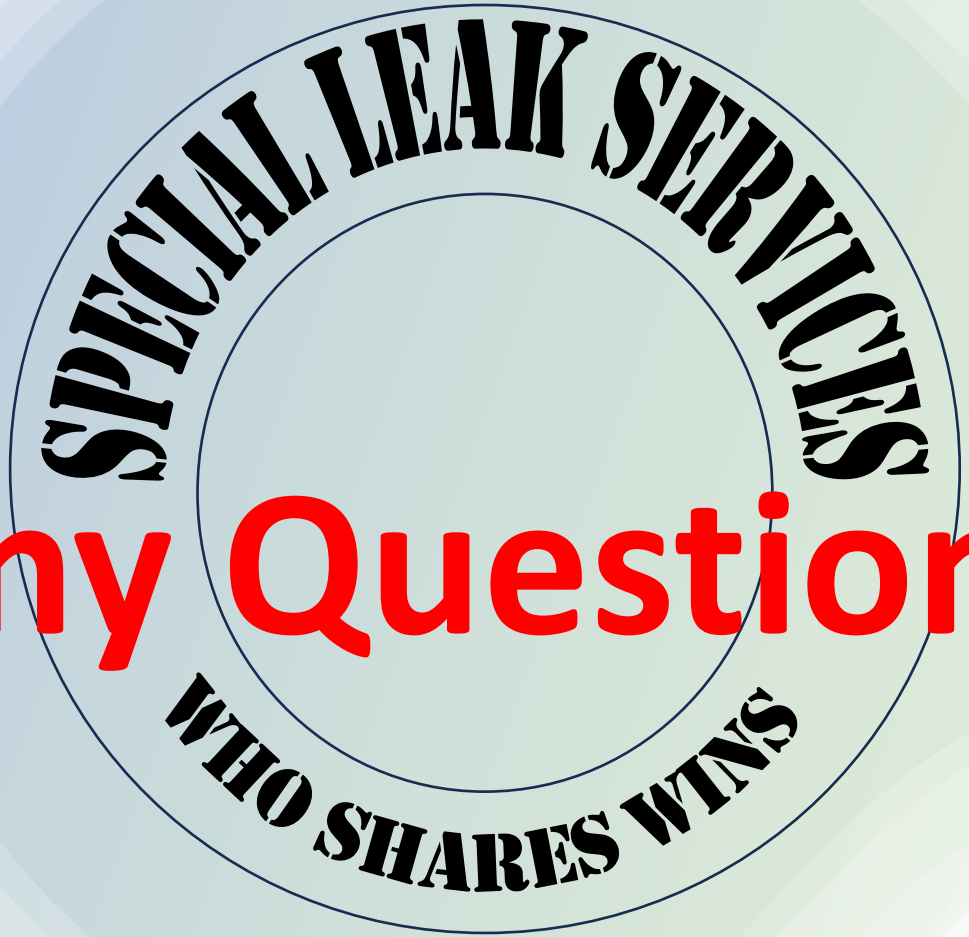




Next steps.

- Planning to commence first in-person meetings in January 2026.
- The first meeting will be at Pynes in Exeter.
- Like the Croydon Group, we are planning to meet quarterly.
- All water companies & contractors with a current water company contract are welcome to join the group.
- If you are interested in joining then please provide email contact details to Jason or myself for your planning and repair teams (preferably separate contacts).
- We will share the contact details across the group to create an expert repair forum
- Supply chain will also have the opportunity to interact with the group and present solutions.


SPECIAL LEAK SERVICES
WHO SHARES WINS



Any Questions?

Conference close



Bob Taylor

Chief Executive Officer

Portsmouth Water

Our exhibitor-supporters and media partner

aqualogic water conservation

arqiva

ATMOS INTERNATIONAL

AVK

BERMAD

CLA-VAL

FYLD

GUTERMANN

HWM Global

OVARRO CONNECTING TECHNOLOGIES

SME WATER

suez

SYNTHOTECH

TECHNOLOG

TETRA TECH

rps A TETRA TECH COMPANY

THE UK WATER REPORT POLICY | REGULATION | FINANCE

GWI GLOBAL WATER INTELLIGENCE

Thank you to last night's Pre-Conference drinks sponsor

TETRA TECH | rps A TETRA TECH COMPANY

Organised by lodestar

Media partner THE UK WATER REPORT POLICY | REGULATION | FINANCE

Conference close



Bob Taylor

Chief Executive Officer

Portsmouth Water

Organised by

lodestar

Media partner

THE UK WATER REPORT

POLICY | REGULATION | FINANCE



Thank you for joining us …

Safe travels home

Organised by

lodestar

Media partner

THE UK WATER REPORT
POLICY | REGULATION | FINANCE