In-pipe condition assessment of cast iron trunk mains – a new approach

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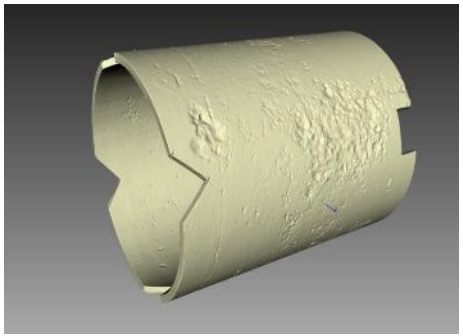
Overview

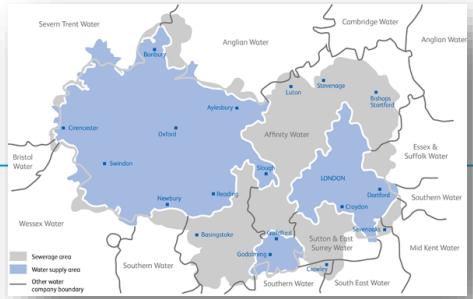
- Thames Water's trunk mains
- Trunk main condition – the problem
- Overview of our trunk main innovation project
- Fast-track field trial
- Trunk main test rig at Kempton
- Trialing technologies
- Future use of in-pipe condition assessment
- Summary



Thames Water's trunk mains

Our network

- 2,600 ML/d
- 9 million customers
- 3,600km of trunk mains
- Diameters up to 60" (1500mm)
- Laid up to 200 years ago
- Predominantly cast iron



Key influences

- Leakage
- Burst risk
  - Supply interruption
  - Flooding
- Long-term research activities
- Late 2016 trunk main bursts
  - Independent forensic review
  - Internal strategic review

Strategic management

- Modelling
  - Consequence and likelihood of failure
  - Range of input data including routine spot NDT inspections
- Intervention toolkit
  - Contingency planning
  - Leakage surveys and valve checks
  - Online monitoring systems
  - Replacement/rehabilitation

Trunk main condition – the problem

Flood damage to basement (Upper Street burst)

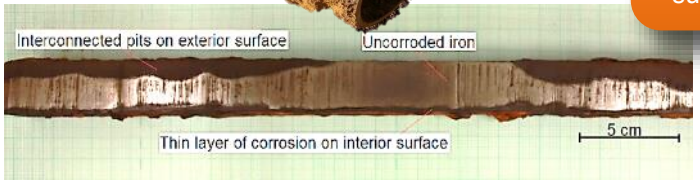
Level of trunk main burst risk is too high and replacement rates are too low (500 year asset life implied)

…there's little incentive for development of in-pipe devices for trunk mains because water companies aren't investing enough in their networks…

We can't secure adequate investment without proving we understand consequence AND probability aspects of risk…

Failed 21" pipe from second Leigham Vale burst

…but probability depends on pipe condition, which is very variable, so we need a condition surveying capability…



Northwold Road burst

Overview of our trunk main innovation project

Build a pipe test rig at Kempton Park WTW

A safe proving ground for trunk main technologies

▼

Rig trials of in-pipe condition assessment tools

Shortlist of the best tools and stimulation of technology development

▼

Field trials of the best in-pipe condition assessment tools

Validated results from real buried trunk mains

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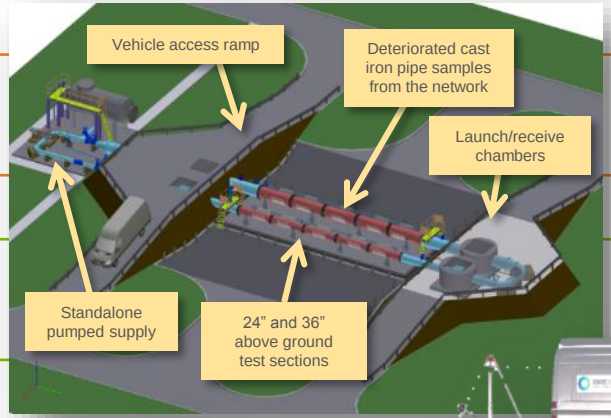
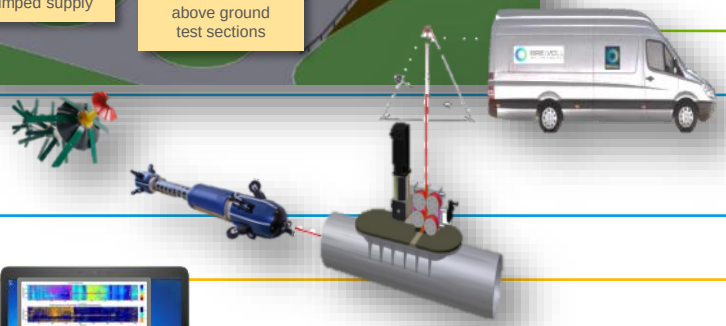
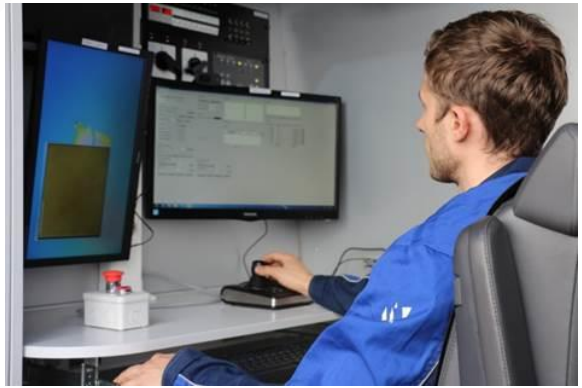
Supporting research and model development

Decision support tools to use the new and existing condition data





Fast-track field trial



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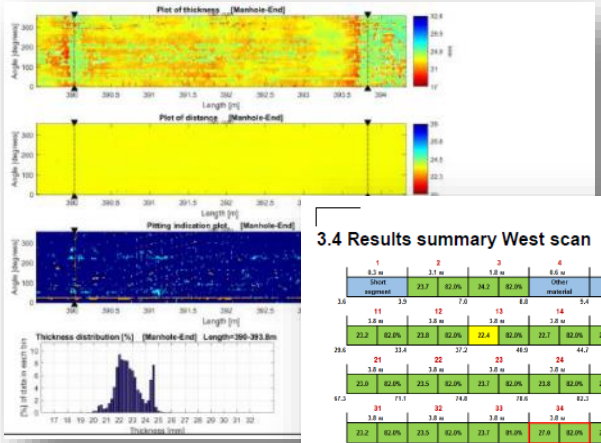
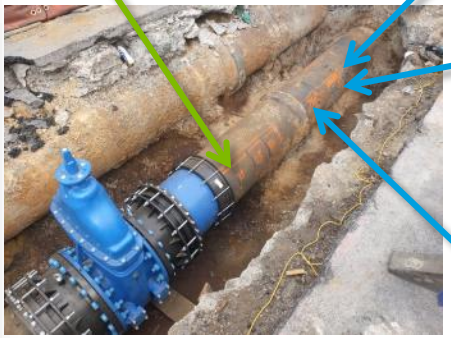
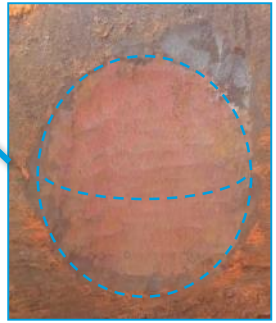


calibration features
ground strips
13-50mm wide × 1-3mm deep





validation features
single/clustered drilled holes
dished patches
18-260mm diameter × 8-16mm deep

Follow-up development of the sensors and analytics by the service provider is ongoing…. a deferred success?

Overview of our trunk main innovation project

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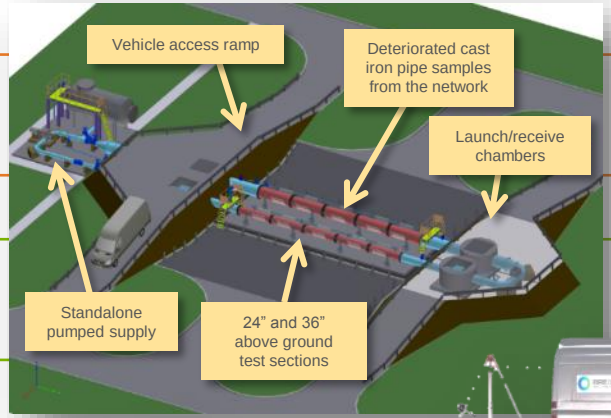
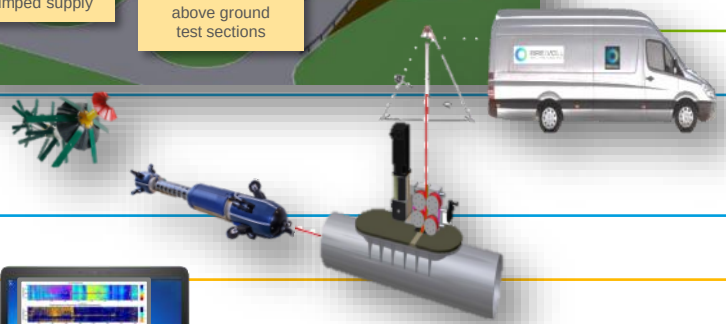
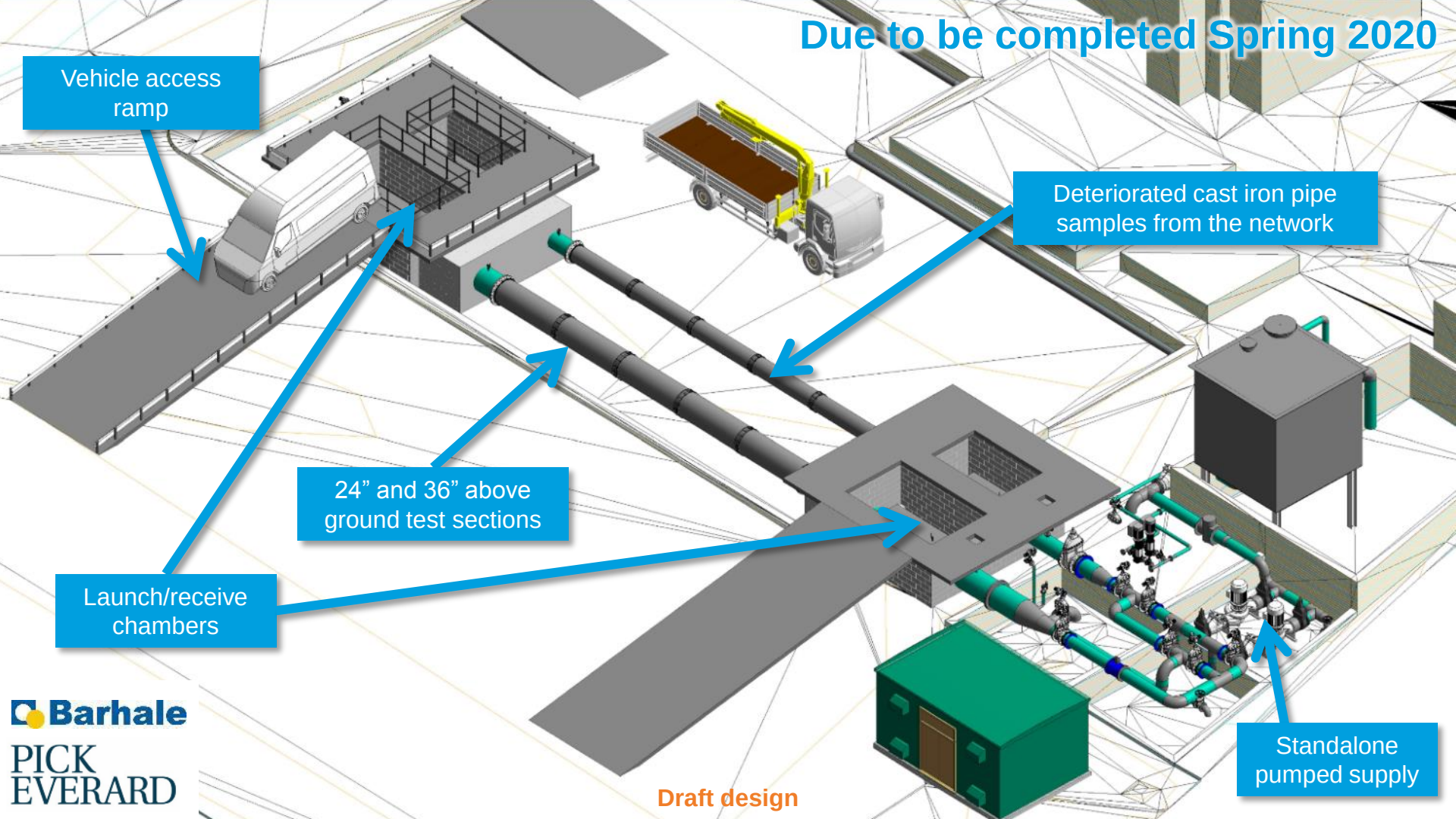




Site clearance

Trunk main test rig

Due to be completed Spring 2020



Barhale

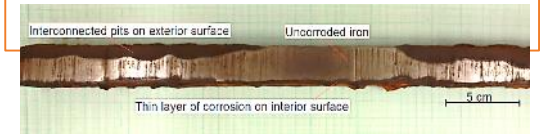
PICK EVERARD

Draft design

Trialing technologies

Key requirements

- Benign effect on water quality
  - No damage to internal surface
  - Approved materials
- Able to assess long lengths of thick cast iron at high resolution
  - Wall thickness
  - Corrosion defects
  - Casting defects
  - Cracks



Market research

- Our own experience, contacts and research
- Water industry sources, e.g.

isle CATwizard

ADVANCED CONDITION ASSESSMENT & PIPE FAILURE PREDICTION PROJECT

- Call for innovation

ENERGY INNOVATION CENTRE

Approach

- Publicise the industry's collective needs (opportunities)
- Collaborative trials to evaluate and validate robustly
- Share results to maximize value for all
- Endorsed by:

SEVERN TRENT

Affinity Water
Your local supply, on tap

United Utilities
helping life flow smoothly

THE UK WATER PARTNERSHIP

Thames Water

Future use of in-pipe condition assessment

Investment in a targeted main without an in-pipe condition survey

Largely unknown condition

….and with an in-pipe condition survey (£)

	Reduced cost for the overall project?	Future viability of surveys if this result is typical?
All good condition	✓	?
Isolated poor condition	✓	✓
Region of poor condition	✓/✗	✓
Scattered poor condition	✗	?
All poor condition	✗	?

Summary

What's the problem?

- We need to be able to assess the condition of cast iron trunk mains better, in order to increase the efficiency of mains replacement activities that reduce the risk to our customers and society

And what is the 'new approach'?

- Raising awareness in the wider market of our in-pipe condition assessment needs
- Providing a purpose-built test bed to enable detailed evaluation of in-pipe devices without risk to customers or our network
- Working collaboratively to maximise the value to us, other UK water companies, and the technology suppliers
- Making sure the research and modelling keep pace

Thank you