

UKWIR Project original number 12 (paragraph 2)

Leak noise characterisation for buried pipelines

Need for project

Leakage is one of the key challenges facing the water industry and UKWIR have an ambitious aim of “achieving zero leakage in a sustainable way by 2050”. This aspirational target cannot be achieved with existing processes, techniques and equipment, so UKWIR have developed a strategic programme of research projects to address this.

One area is investigating leak detection and location methods and UKWIR are working with the University of Southampton on fundamental research, specifically exploiting acoustic and vibration detection methods. This builds on gap analysis work previously carried out by the University. The research is being progressed via a number of PhD projects which feed into the UKWIR Zero Leakage 2050 programme. One of these projects is summarised below.

Project overview and objectives

This research recognises that there is currently a lack of knowledge of the acoustic characteristics of leaks. Preliminary work has been undertaken at the University of Southampton to identify the potential mechanisms for leak noise, and this project follows on from this work with more field based research. The project objectives are to: -

- Characterise differences in leak signals between metal/plastic pipes
- Determine how leak characteristics (shape, size and flow rate) affect leak signals.
- Investigate effects of pipe dimensions/materials on acoustic signatures
- Deduce how different soil types and content pressure can influence leak signals.
- The effects of surrounding soil on buried pipelines.

- Determine mechanisms of leak signals.

Industrial assistance for this project has been provided by Portsmouth Water.



Figure 1. Leak detection & excavation

Work programme and timetable

This 4-year PhD commenced in late 2018 and is due for completion in 2022. The first year comprised taught courses, a group design project and a mini individual research project. During years 2-4, the main body of the PhD research will be carried out, including: analysis of real data acquired on the network; analysis of data acquired at UK and international test sites; and acquisition and analysis of data in a controlled laboratory environment.

Benefits

By characterising leak noise to estimate the leak flow rate, type of pipe material and type of leak (e.g. ferrules), water companies could make more informed choices on how and where to excavate, bringing potential cost efficiencies for the Industry.

Project team

This research is being carried out by Olusegun Adesina at the Institute of Sound and Vibration Research at the University of Southampton under the supervision of Dr Jen Muggleton. The UKWIR Programme Lead is Jeremy Heath, SES Water, with support from



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