

Upstream Flow Monitoring Zones Setting the Scheme

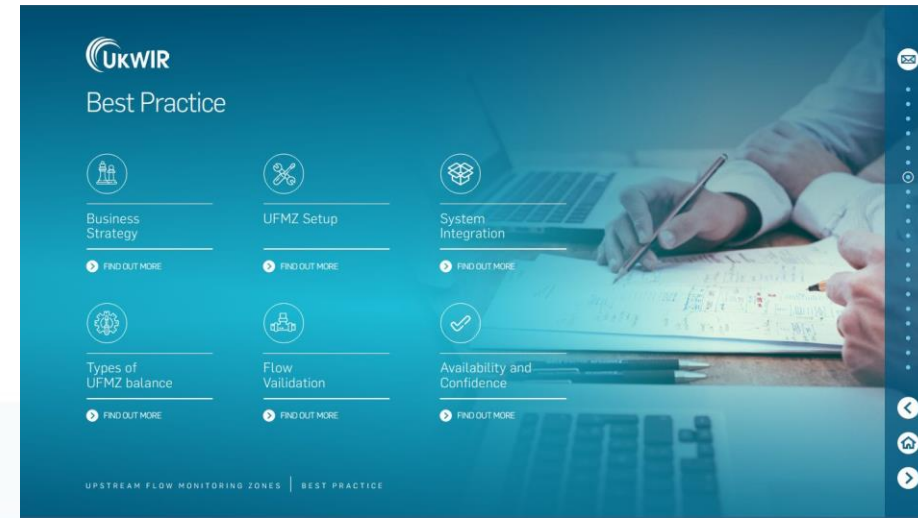
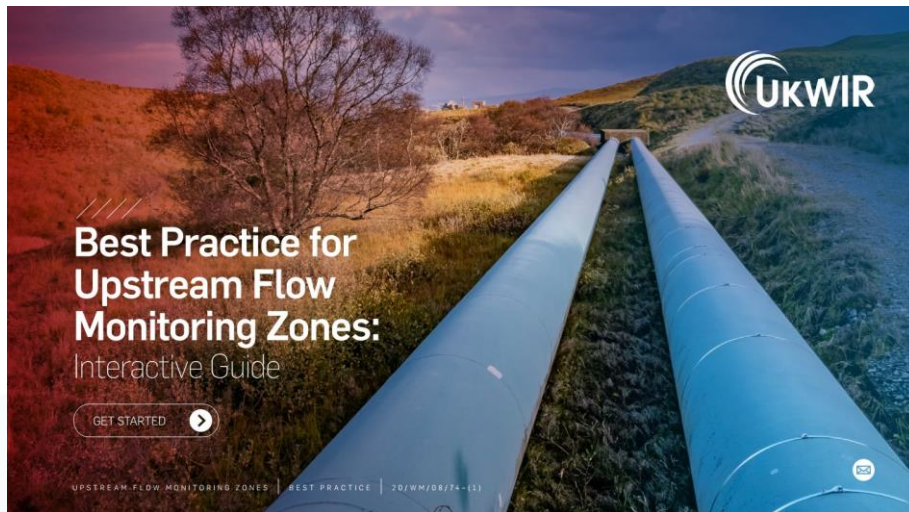
Ken Cartwright
Senior Associate Engineer



UKWIR - Best Practice for Upstream Flow Monitoring Zones

(Issued 2021 UKWIR – Authored By AtkinsRéalis)

<https://ukwir.org/best-practice-for-trunk-main-flow-monitoring-areas-0>



‘Upstream Assets (Trunk mains) are the arteries of our water supply networks that ensure water keeps flowing out of customer taps, but they are also the assets that cause the most catastrophic supply events and damage on failure.

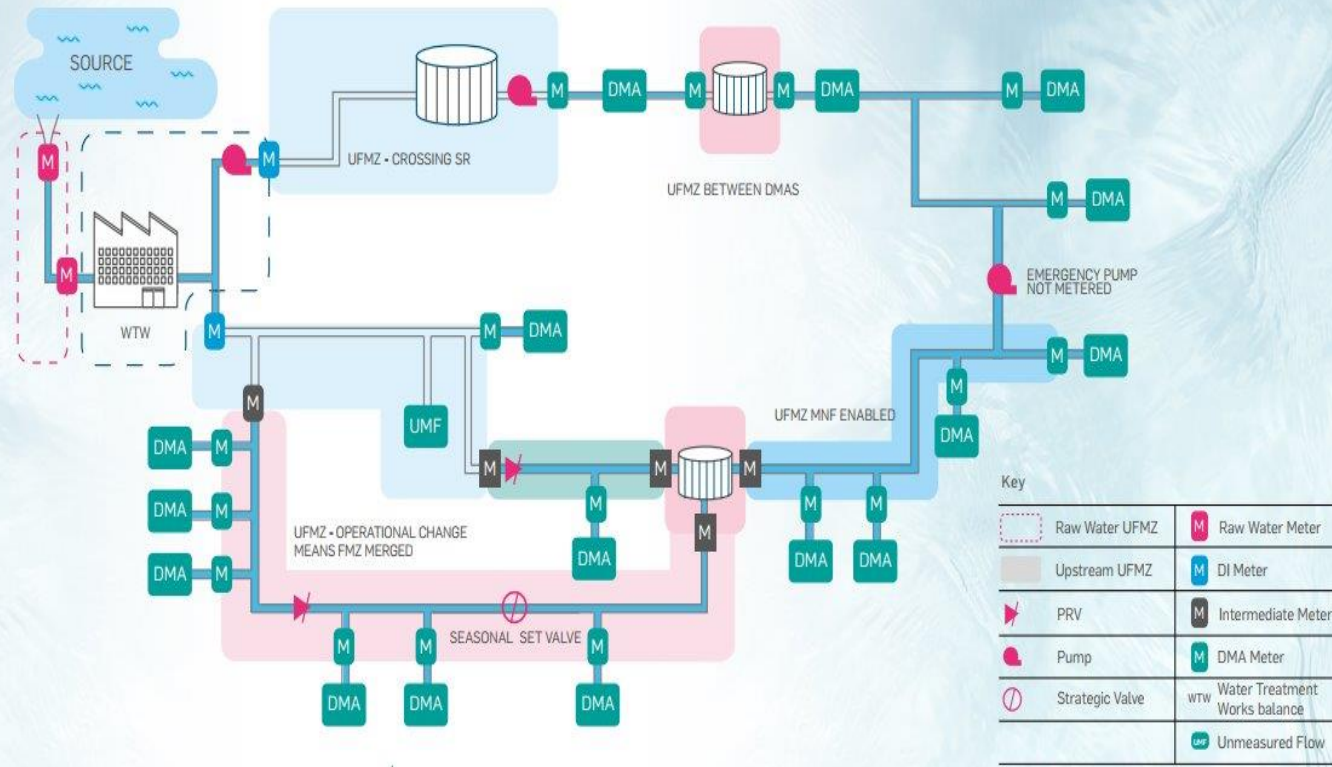
With that in mind it makes no sense that historically they have been the poor relation with regards to full and accurate sensing, monitoring and maintenance.’

**UKWIR Best Practice for Flow Monitoring Zones
Co Author - Dave Collins – AtkinsRéalis**

What are UFMZs



UFMZ Setup



UPSTREAM FLOW MONITORING ZONES | BEST PRACTICE

Also known as: -

- Tiles
- TMA Balances
- Trunk Main DMAs

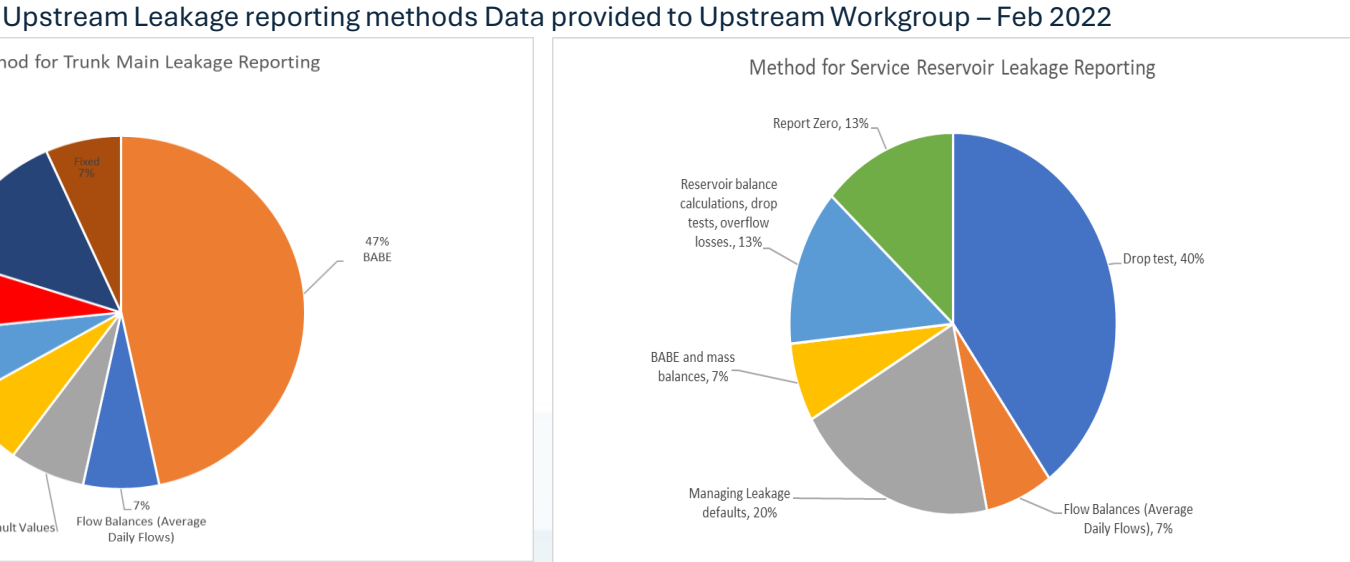
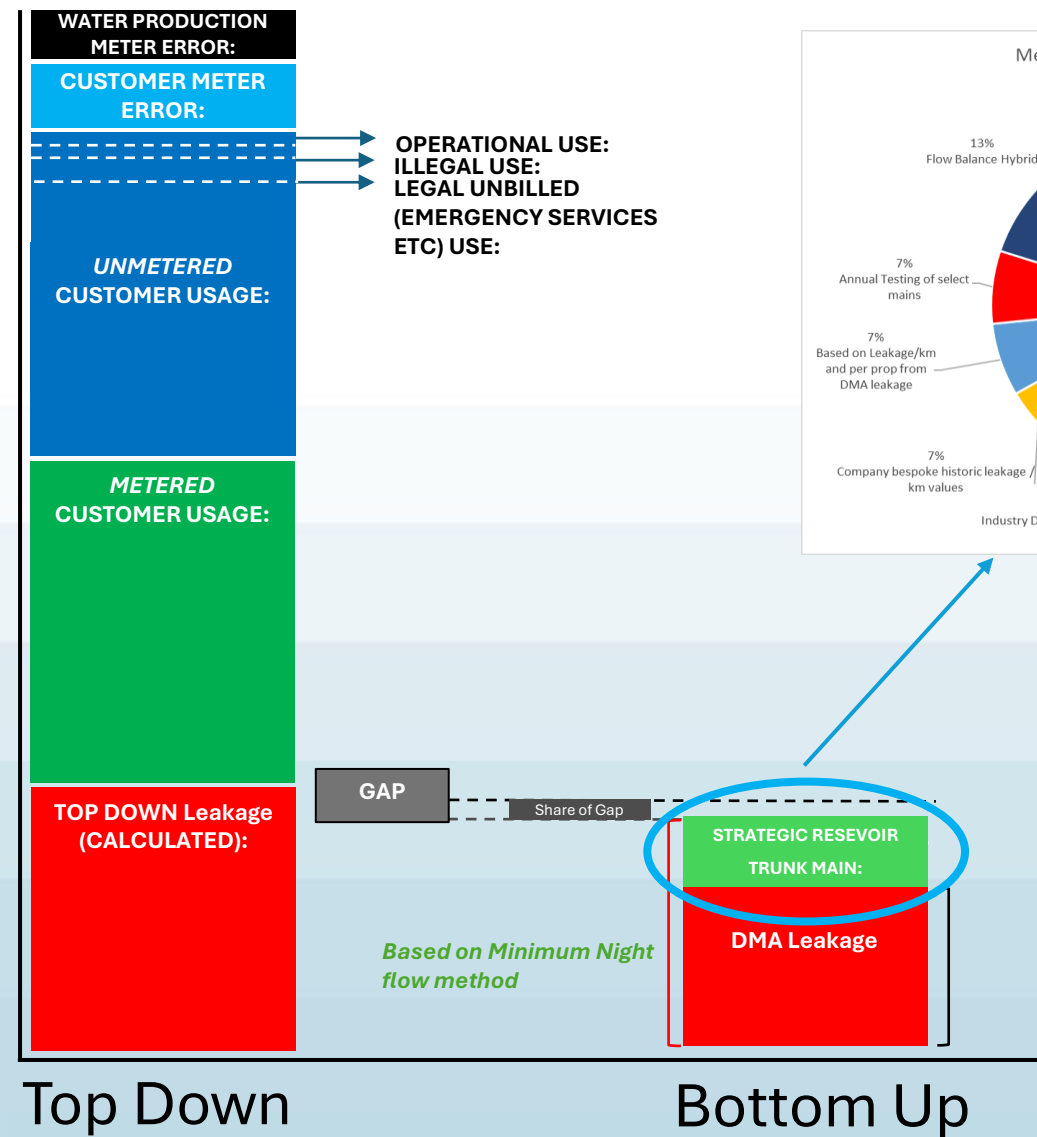
Why have UFMZs?

- Account for every drop of water extracted from the environment
- Unable to assess how water dissipates across the network - especially in incidents
- Improve Supply Demand balances and the Water Balance
- No standards – not treated like Assets in the same way DMAs area

Benefits – Far wider than leakage

- Network and operational awareness;
- Incident management and reviews;
- Improved network models
- Improved evidence for Capital Investment;
- Improved Production Planning;
- Improvements to Water Quality

The Water Balance – Upstream Leakage



BABE – Burst and Background Estimations

Started to be used from 1994 to estimate levels of trunk main leakage based on: -

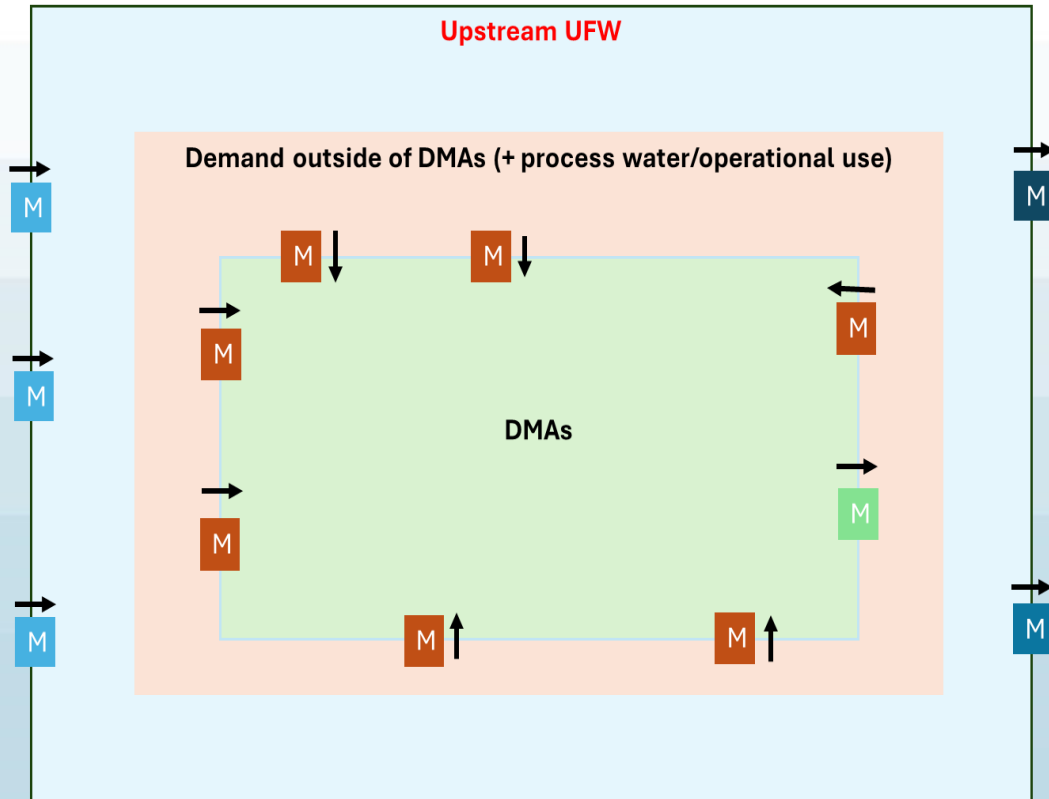
- Length, size and material of mains;
- Historic repair records;
- Historic active leak detection performance;
- Perception of condition and pressures.

Strategic Balances

- Reporting

Reporting Area Upstream leakage =

- + Distribution input
- Exported Water
- Measured Flow into DMAs
- Upstream Demand



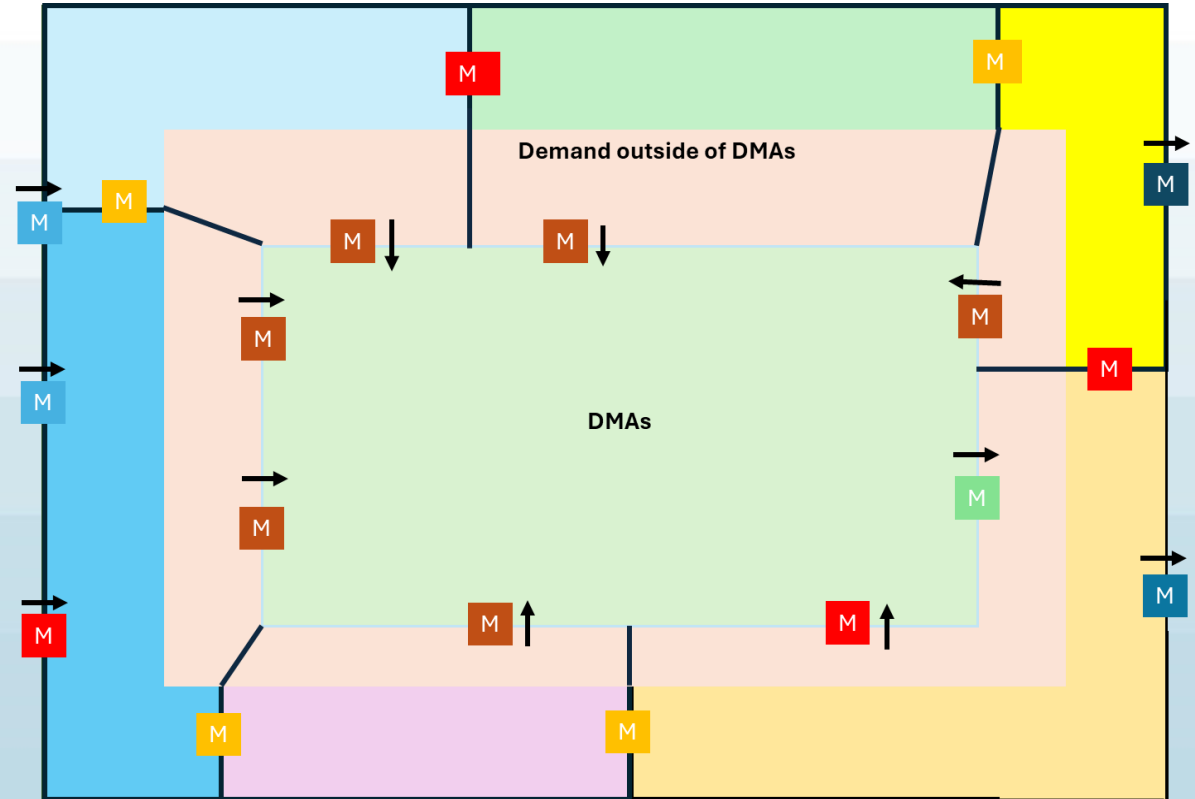
UFMZs

- Targeting and Improvement

UFMZ UFW =

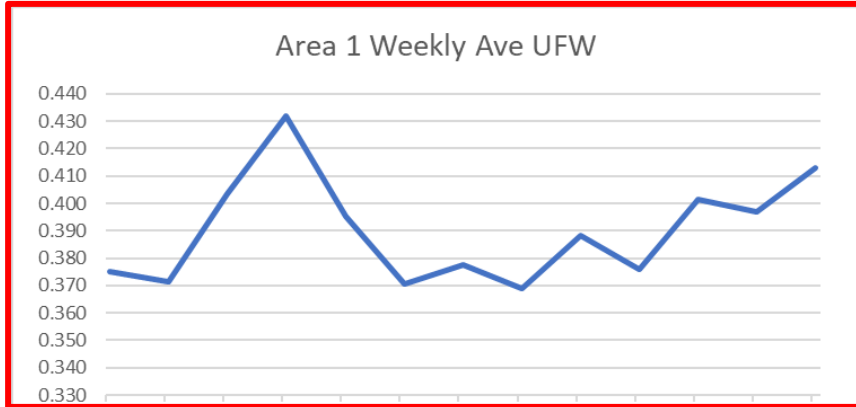
- + Water in
- water out
- Measured Flow into DMAs
- Upstream Demand

= Σ



Good Balances

– Updating Demands Estimate / Findings leaks



- Single trunk main with off takes to Semi-Rural DMAs
- **DI meter vs 7 DMAs and 1 bi-directional DMA meter**
- 180 properties in Non DMA area

• **Unvalidated UFW = 0.410MI/d**

- Non DMA Demand in Leakage system 0.035MI/d
- UFW profile calculated demand 0.130MI/d

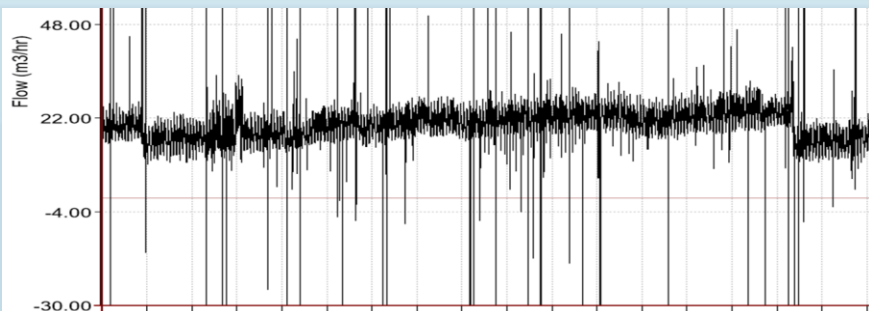
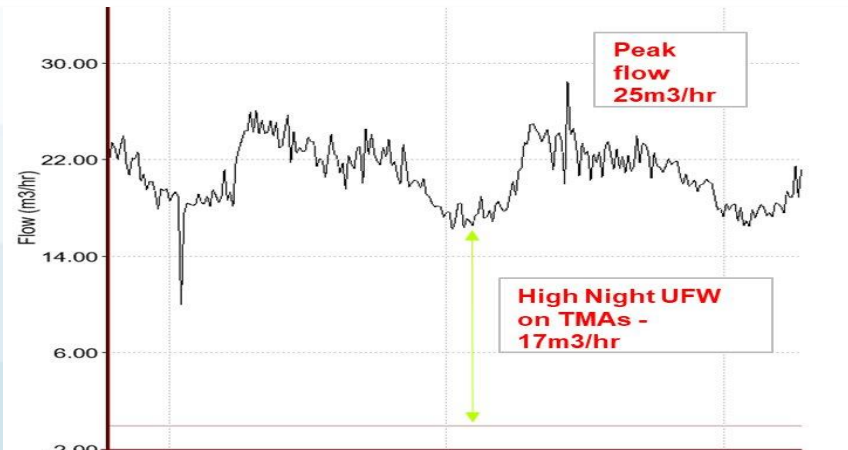
Actions –

- Update Demand for Non-DMA area to 0.13MI/d
- Review demand in area and update systems.
- Review Zero error on DI meter
- Review bi-directional meter
- Undertake leak detection

• **Validated UFW – 0.305MI/d**

1 Trunk main leak found – 0.1MI/d

Outstanding UFW - 0.2MI/d



The Upstream Workgroup

- Formed in 2022
- Facilitated by AtkinsRéalis
- Free of charge for all Water Companies to attend
- Bi-annual meetings
- Guest presentations by Water companies, UFW software providers and suppliers of Trunk Main UFW detection equipment
- Sessions have been attended by 14 of the UK based water companies



Areas of Improvement Identified in UKWIR Report

- Leakage Software to be updated for UFMZs validation, infilling data and potential for reporting
- Meter accuracy + impact of telemetry standards
- Detection - Cost and risk
- Develop a Proactive Culture - Confidence and Uncertainty

Upstream Leakage Technologies and Services

- Highlighted in request – who else / what else is known.

Acoustic (Lift and Shift)

- [Gutermann-water AquaScan_TM2](#)
- [LeakFinder-ST™ Leak Detection Product | Echologics](#)
- [PermaNET+™ \(hwmglobal.com\)](#)
- [Leak Noise Loggers and Correlators \(ovarro.com\)](#)
- [Hydroguard-Trunk-Main-Monitoring](#)
- [Aquarius Spectrum Leak Detection and Analysis - Detection Solutions \(sebatechnik.com\)](#)
- [WATER LEAK DETECTION DEVICES \(sebatechnik.com\)](#)
- [FIDO AI: Advanced water leak detection and management](#)

Acoustic Permanent

- [Atmos Pipe \(atmosi.com\)](#)
- [Trunk minder - Intelligent Pipeline Monitoring - Syrinix](#)
- [HiScan - Gutermann](#)
- [Zonescan Alpha - Gutermann](#)

Analytics

- [Pipeline - GFW](#)
- [TaKaDu - Central Event Management \(CEM\) for water utilities](#)

In-pipe (Tethered / Free flow)

- [WRC - Sahara Smartball PipeCrawler](#)
- [Smartball - Xylem](#)
- [Pipe Crawler - Xylem](#)
- [JD7- JD7 Technology Ltd](#)
- [Flowrider™ - Pipa-UK](#)
- [AquaSnake](#)
- [Nautilus Orb - Suez](#)

Consumption / Usage

- [Teccura](#)
- [Highlow Water.](#)

Meters / Monitoring / Meter Calibration / Verification

- [Z-Tech](#)
- [Veriflo Ltd](#)
- [FMV GROUP | Flowlee Meter Verification](#)
- [Calmaster \(Kent ABB\)](#)

Meters / Monitoring

- [Siemens](#)
- [Kent ABB](#)
- [McCrometer](#)
- [Ultrasonic \(Katronic, Flexim, Nervus\)](#)
- [Smart Water - AVK UK](#)
- [LeakControl - rbs-wave](#)

Optic Fibre / Microwaves

- [Assures + Treble+ - Terra15](#)
- [Focus Sensors Ltd](#)
- [Craley Group](#)
- [Sensor DDS LID](#)

Aerial / Imagery / Satellites

- [Utilis / Asterra - Suez](#)
- [Rezatec](#)
- [Neptune Water Leaks \(Italian\)](#)
- [APEM \(apemltd.com\)](#)
- [UAS \(Unmanned Aerial System\) & USS \(Unmanned Surface System\) technology](#)
- [Drones \(Various\)](#)

Other

- [Sniffer Dogs - \(cape-spc.com\)](#)
- [Tank Leak Finder - Panton McLeod](#)
- [IDROLOC™ - SUEZ](#)
- [Speir Hunter Ltd - Remote Pipeline Inspection Tech](#)
- [Various Pipe Condition assessment tools](#)

UFMZs – Moving to be Proactive

- A change in culture is needed.
- Accept its UFW
- Resolve uncertainties, don't hide behind them
- Seek to obtain the best estimate of upstream leakage with the data available
- Strive to improve



thank you